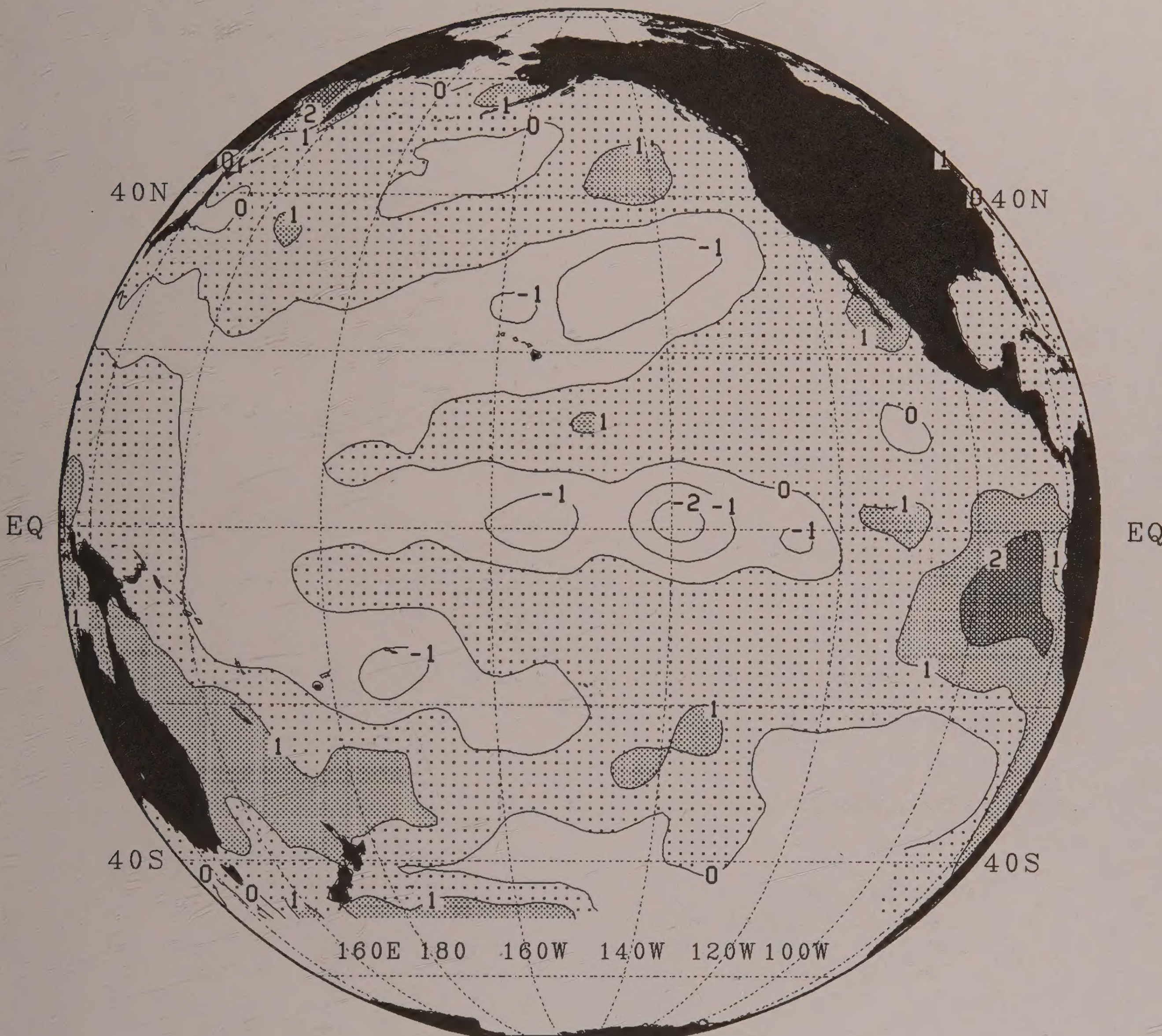
気象庁海洋月報

Monthly Ocean Report

July 1998 (No. 67)



Climate and Marine Department
Japan Meteorological Agency

気象庁 気候・海洋気象部

平成１０年７月

気象庁海洋月報は、気象庁 気候・海洋気象部 海洋課で作成しています。

本月報に関する問い合わせは、

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Monthly Ocean Report is prepared by the Oceanographical Division, Climate and Marine Department, Japan Meteorological Agency.

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表紙は、1998年7月の太平洋の月平均海面水温偏差図です。

陰影部は、平年より高温の海域を示しています。

The figure on the front cover shows the monthly mean SST anomalies for July 1998 in the Pacific Ocean.

Areas of positive anomalies are shaded.

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海況の特徴（１９９８年７月）

日本近海の海況

海面水温は，九州の西，四国沖，東海沖及び北海道の東で平年より0.5℃以上高かった。日本海中部及び三陸はるか沖では平年より0.5℃以上低かった（第4図）。

黒潮は，九州から紀伊半島にかけて接岸した後，離岸して南東に流れ，八丈島の南で向きを変えて，上旬は三宅島付近を，中・下旬は三宅島の東を通り，房総半島沖を東に流れていた（第9図）。

親潮系の冷水の沿岸寄りの分枝は38.0゜N，142.7゜Eまで，沖合の分枝は39.5゜N，148.0゜Eまで，それぞれ達していた（第5図）。

太平洋の海況

太平洋赤道域の海面水温は，東部の正偏差域が先月より広がり，120゜W以東で平年より１℃以上高かった。160゜Wから120゜Wにかけて-１℃以下の負偏差域が見られた。西部では，フィリピン近海から155゜Eにかけて平年より0.5℃以上高かった。

北太平洋では，前月まで日付変更線以西の30゜N付近に見られた正偏差，40゜N付近の負偏差はともに弱まった。オホーツク海には+2℃以上の正偏差域が見られた。35゜N，165゜E付近及び40゜N，140゜W付近に+1℃以上の正偏差域が，30゜N付近の160゜Wから130゜Wにかけて-1℃以下の負偏差域が見られた（第16図）。

Highlights July 1998

Seas adjacent to Japan

Positive SST anomalies exceeding +0.5°C were found west of Kyushu, off Shikoku, off Tokai and east of Hokkaido. SSTs were more than 0.5°C below normal in the central Japan Sea and far off Sanriku (Fig. 4).

The Kuroshio flowed along the coasts from Kyushu to the Kii Peninsula, then flowed southeastward. After turning north at the south of Hachijo Island, it passed near Miyake Island in the first 10-day, and passed east of Miyake Island in the rest of the month, then flowed eastward off the Boso Peninsula (Fig. 9).

Coastal and off-coastal branches of the Oyashio cold water extended southward to 38.0°N, 142.7°E and 39.5°N, 148.0°E, respectively (Fig. 5).

Pacific Ocean

In the eastern equatorial Pacific, positive SST anomalies exceeding +1°C have extended westward to 120°W. Negative SST anomalies exceeding -1°C were found between 160°W and 120°W along the equator. In the western tropical Pacific, positive SST anomalies exceeding +0.5°C extended from the seas around Philippines to 155°E.

Positive SST anomalies along 30°N and negative SST anomalies along 40°N, which had been dominant west of the date line until the last month, were both weakened. Positive SST anomalies exceeding +2°C were found in the Sea of Okhotsk. Positive SST anomalies exceeding +1°C were found around 35°N, 165°E and 40°N, 140°W. Negative SST anomalies exceeding -1℃ were found between 160°W and 130°W along 30°N (Fig. 16).

137°E 線低緯度域における力学的海面高度

High dynamic heights in low latitudes of the 137°E meridian

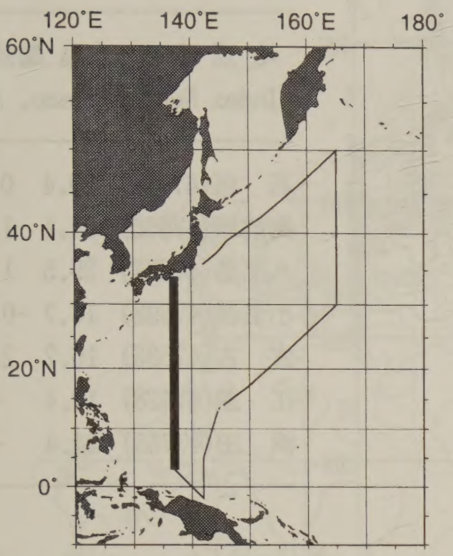


図 **A**. 凌風丸 1998 年 6 ～ 7 月航海の航跡図

Fig. A. Track chart of the R/V Ryofu Maru from June to July 1998.

気象庁の観測船「凌風丸」は, 1998 年 6 月から 7 月に北西太平洋において海洋観測を行った。このうち, 7 月 8 ～ 18 日には, 137°E に沿った海洋観測を行った (図 A 中の太線)。

1997 年春から続いていたエルニーニョ現象は 1998 年 5 月に急速に終息に向かった。今回の観測では, 通常 6°N 付近に見られる北赤道海流と北赤道反流の境界にあたる力学的海面高度のトラフははっきりせず, 力学的海面高度は 3°N から 10°N にかけてほぼ一定の値 ($2.0 \times 10m^2/s^2$) となっていた (図 B)。このため, 通常 5°N 付近に見られる北赤道反流も不明瞭であった。

The R/V Ryofu Maru of JMA conducted oceanographic observations along the 137°E meridian in the western North Pacific from July 8 to 18, 1998 (Fig. A).

The warm episode (ENSO) 1997/98 weakened during May 1998. According to the observations in July 1998, the dynamic heights were about $2.0 \times 10m^2/s^2$ between 3°N and 10°N, and the position of the tropical trough was obscure (Fig. B). Therefore, the North Equatorial Countercurrent, which is normally observed near 5°N, was indistinct.

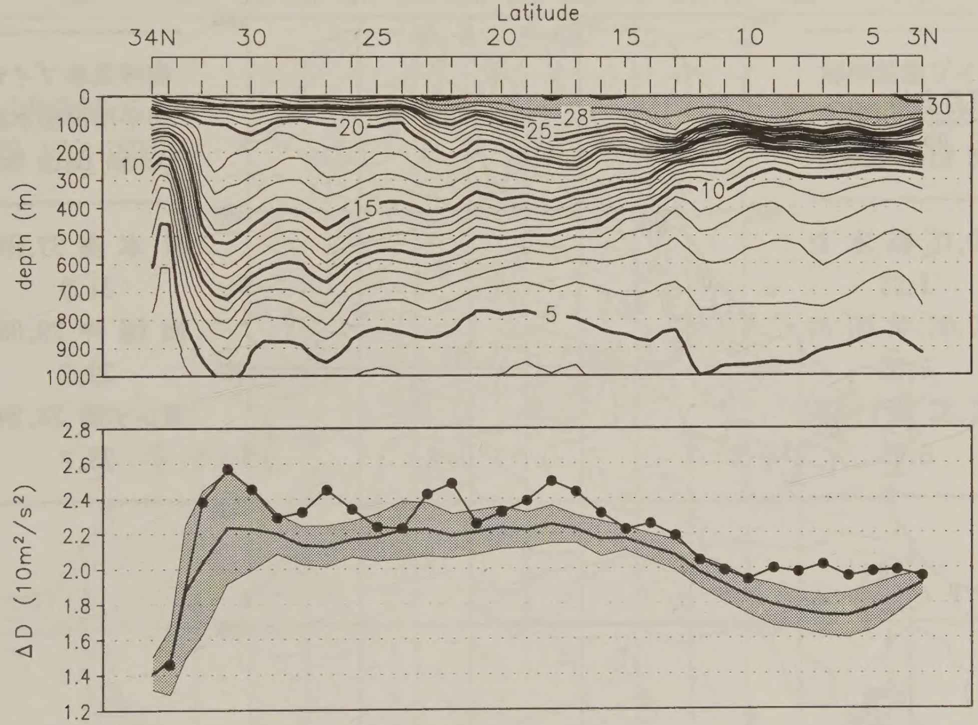
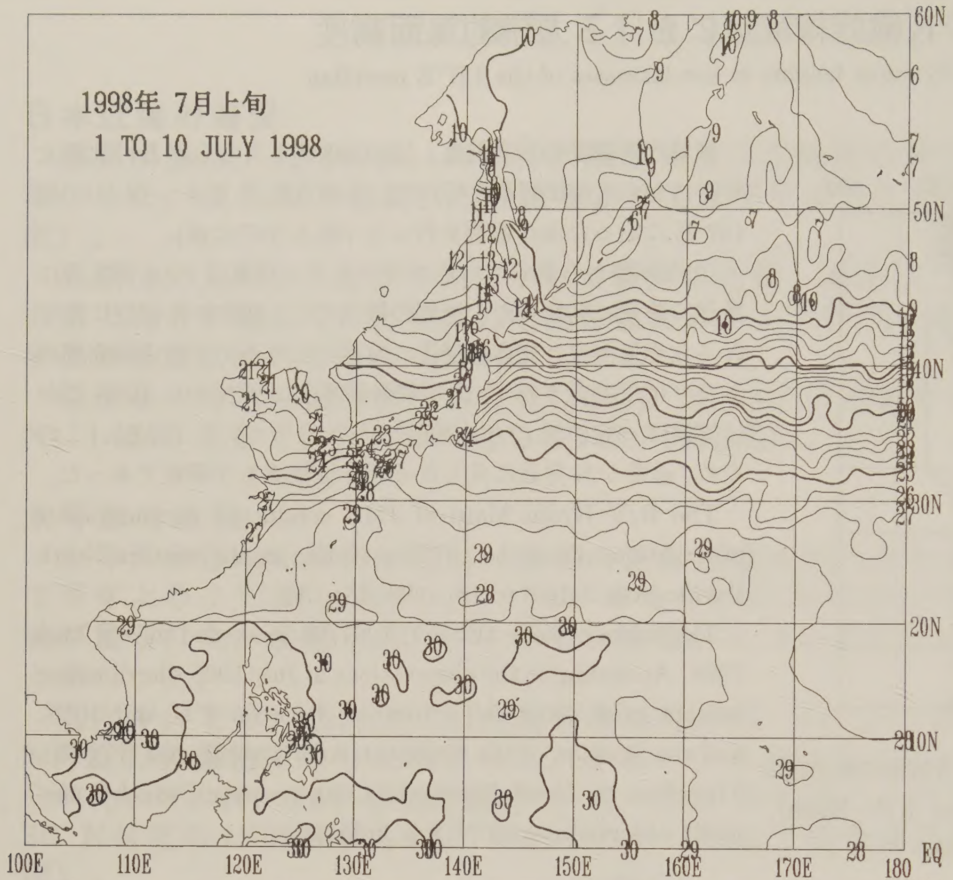
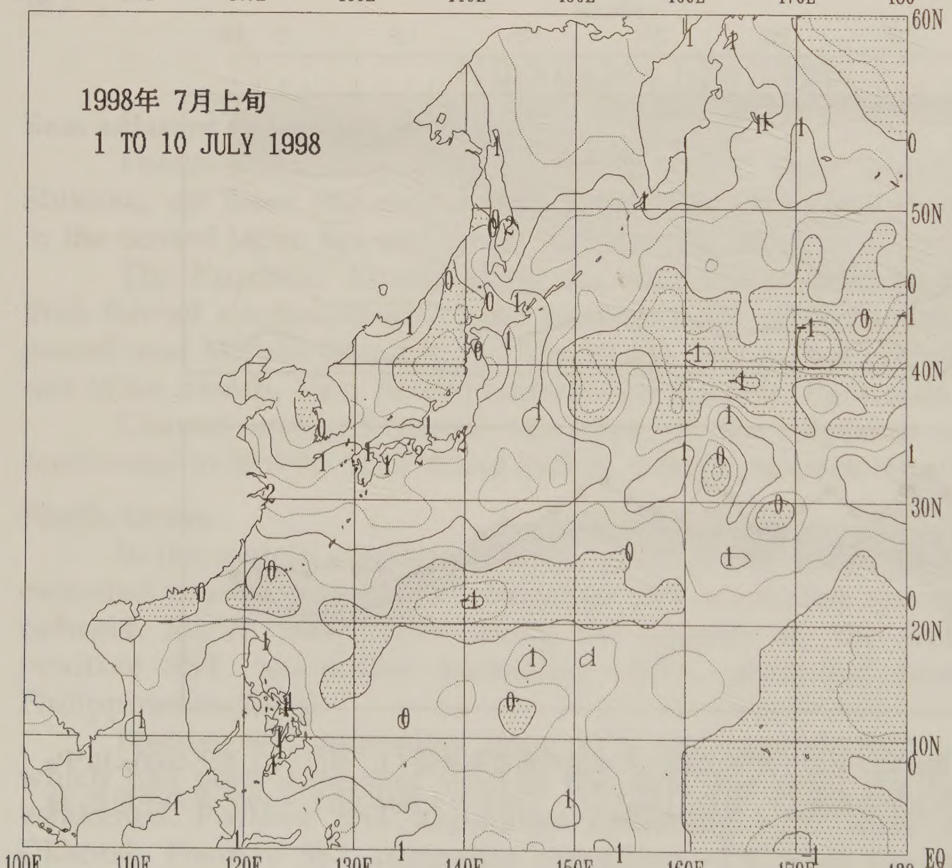


図 **B**. 凌風丸の観測による 1998 年 7 月の 137°E に沿った水温の鉛直断面図 (上, 単位:°C) 及び 1000×10^4Pa 面を基準とした 1998 年 7 月の力学的高度 (下, 単位: $10m^2/s^2$). 下図中の太線は 1972 ～ 1990 年の平均を, 陰影はその標準偏差を示す.

Fig. B. Vertical section of water temperature (top) and dynamic height distribution referred to 1000×10^4 Pa (bottom) along 137°E observed by the R/V Ryofu Maru in July 1998. Contour interval is 1°C and values greater than 28°C are shaded in the top figure. Thick line and shaded area in the bottom figure represent the averaged dynamic height and its standard deviation for the period from 1972 to 1990, respectively.



旬平均沿岸水温(℃)		
Coastal Water Temperature		
地点名	水温	偏差
(Index Number)	Temp.	Anom.
石　垣(47918)	29.4	0.5
御前崎(47655)	24.1	1.0
八丈島(47678)	25.5	1.5
小名浜(47598)	16.7	-0.6
宮　古(47585)	16.2	2.0
江　差(47428)	19.4	-
浜　田(47755)	24.4	-

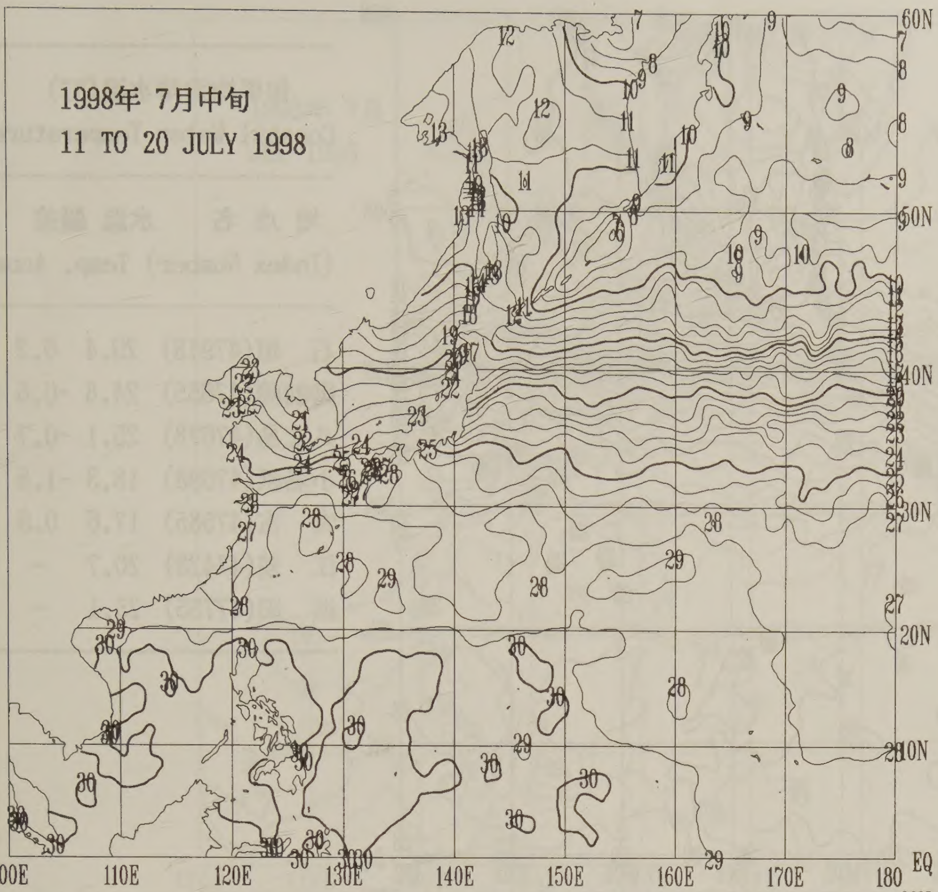


海洋気象ブイロボット 旬平均海面水温(℃)	
Ocean Data Buoy SST	
日本海 37.9N,134.5E	21.0
四国沖 29.0N,135.0E	29.2
東シナ海 28.2N,126.3E	28.7

第1図 北西太平洋旬平均海面水温図(上)及び偏差図(下)(1998年 7月上旬)

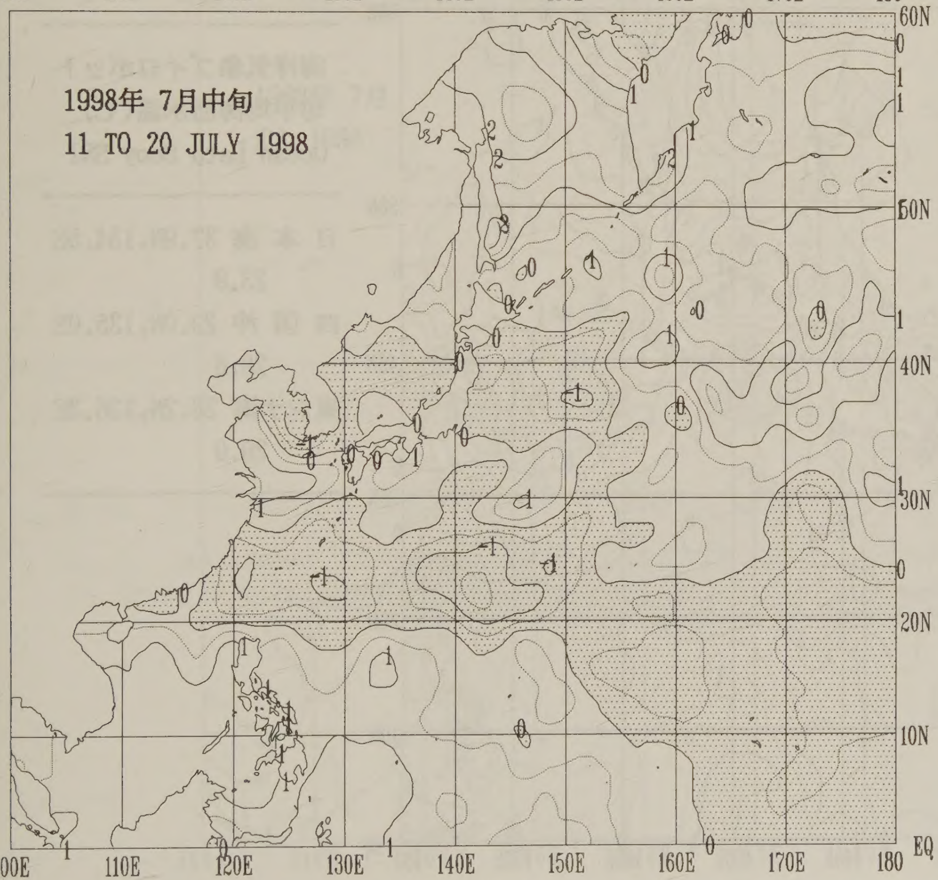
Fig.1 Ten-day mean SST (top) and anomalies (bottom) in the western North Pacific for the 1st ten-day period in JUL 1998. Anomalies are computed from the JMA climatology (1961-90). Contour interval is 1°C and additional anomaly contours of 0.5°C are shown by broken lines. Negative anomalies are spotted.

Ten-day mean SST & Anomalies



旬平均沿岸水温(℃)
Coastal Water Temperature

地 点 名 (Index Number)	水温 Temp.	偏差 Anom.
石 垣(47918)	29.6	0.4
御前崎(47655)	24.2	0.1
八丈島(47678)	24.7	-0.1
小名浜(47598)	17.3	-0.7
宮 古(47585)	17.2	2.1
江 差(47428)	20.4	-
浜 田(47755)	25.5	-

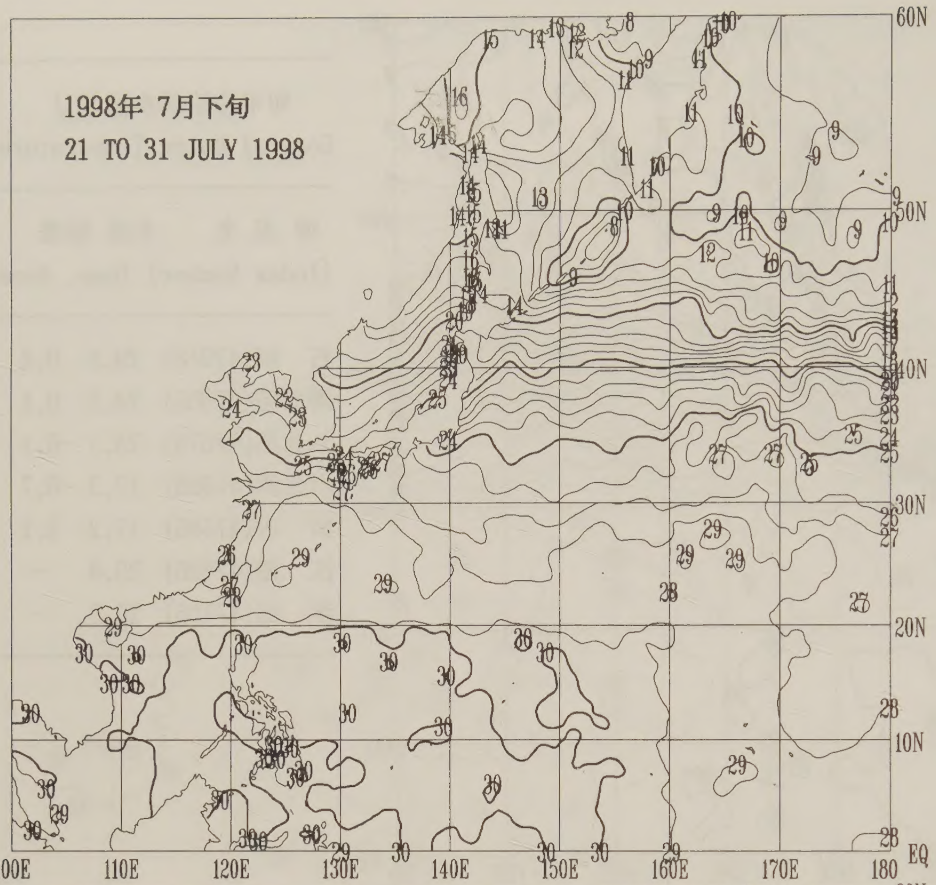


海洋気象ブイロボット
旬平均海面水温(℃)
Ocean Data Buoy SST

日 本 海	37.9N,134.5E	22.1
四 国 沖	29.0N,135.0E	28.9
東シナ海	28.2N,126.3E	29.6

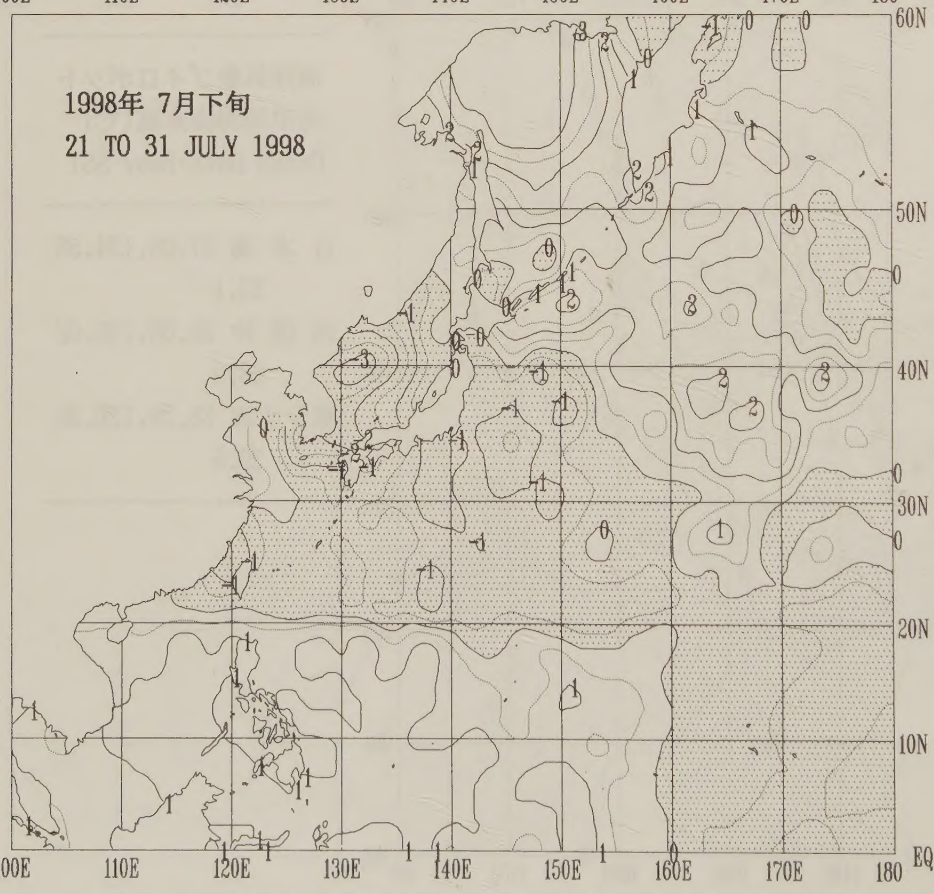
第2図 北西太平洋旬平均海面水温図(上)及び偏差図(下)(1998年 7月中旬)

Fig.2 Ten-day mean SST (top) and anomalies (bottom) in the western North Pacific for the 2nd ten-day period in JUL 1998. Anomalies are computed from the JMA climatology (1961-90). Contour interval is 1°C and additional anomaly contours of 0.5°C are shown by broken lines. Negative anomalies are spotted.



旬平均沿岸水温(℃)
Coastal Water Temperature

地点名 (Index Number)	水温 Temp.	偏差 Anom.
石　垣(47918)	29.4	0.2
御前崎(47655)	24.8	-0.6
八丈島(47678)	25.1	-0.7
小名浜(47598)	18.3	-1.5
宮　古(47585)	17.6	0.9
江　差(47428)	20.7	-
浜　田(47755)	25.1	-

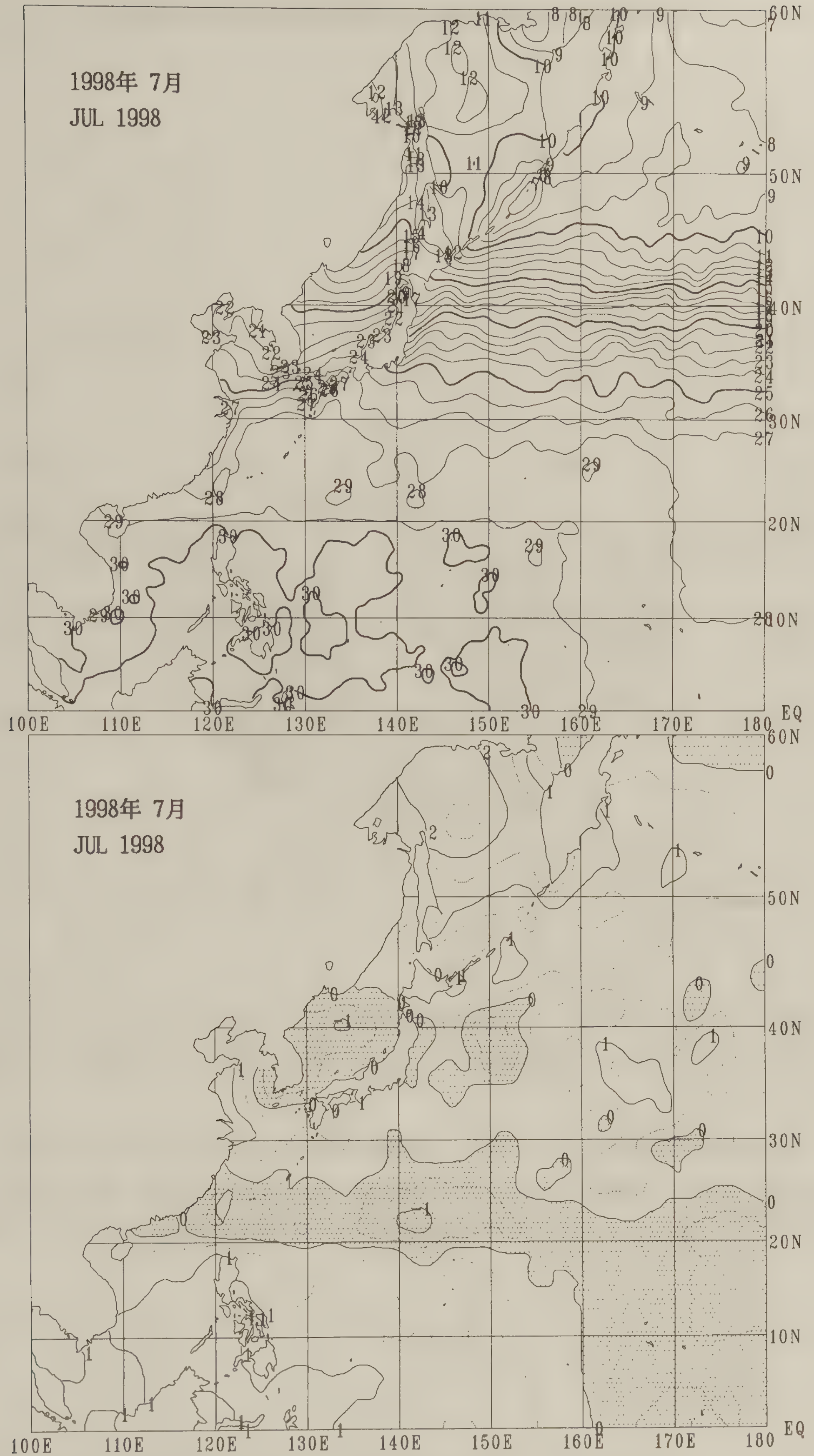


海洋気象ブイロボット
旬平均海面水温(℃)
Ocean Data Buoy SST

日本海	37.9N,134.5E	23.9
四国沖	29.0N,135.0E	28.6
東シナ海	28.2N,126.3E	29.0

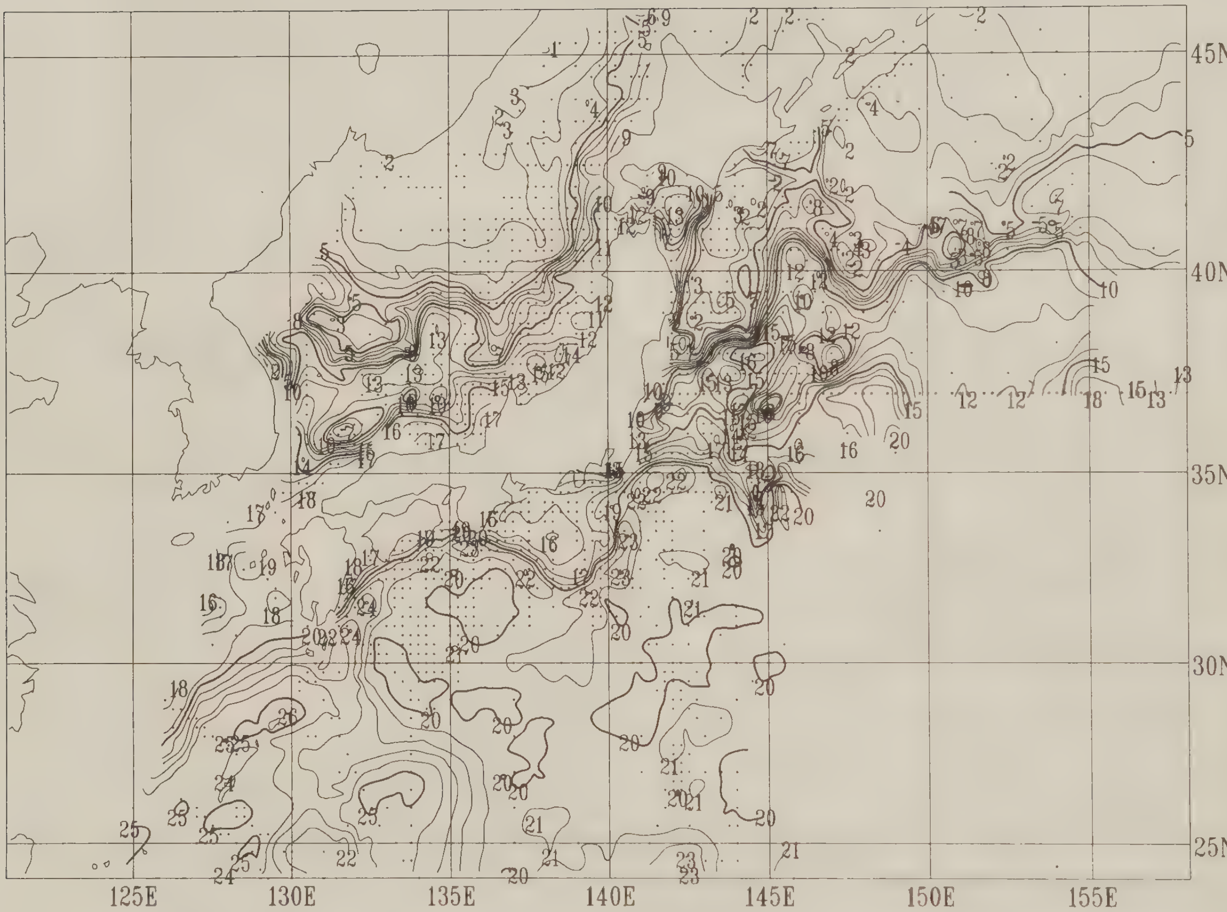
第3図 北西太平洋旬平均海面水温図(上)及び偏差図(下)(1998年 7月下旬)

Fig.3 Ten-day mean SST (top) and anomalies (bottom) in the western North Pacific for the 3rd ten-day period in JUL 1998. Anomalies are computed from the JMA climatology (1961-90). Contour interval is 1°C and additional anomaly contours of 0.5°C are shown by broken lines. Negative anomalies are spotted.



第4図 北西太平洋月平均海面水温図(上)及び偏差図(下)(1998年 7月)

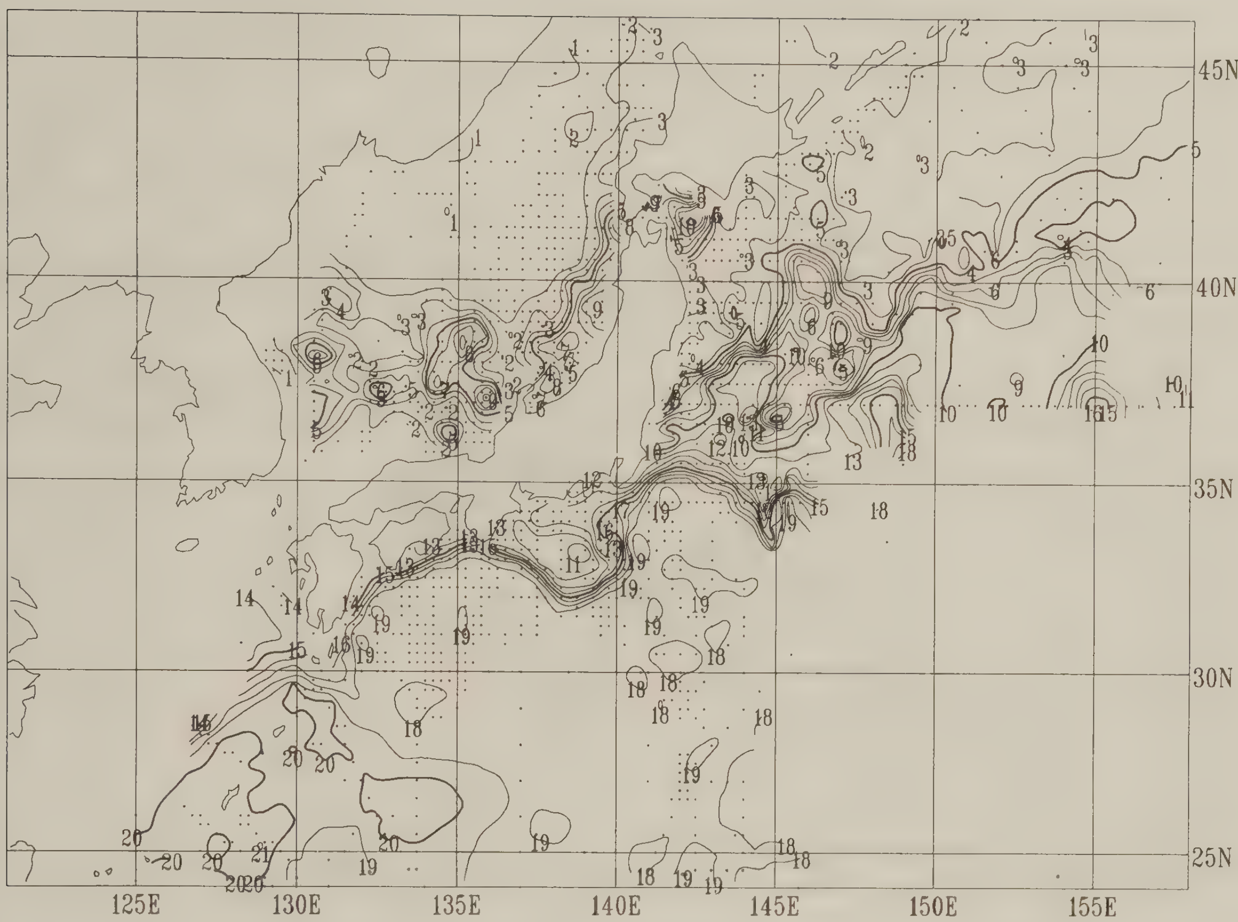
Fig.4 Monthly mean SST (top) and anomalies (bottom) in the western North Pacific for JUL 1998. Anomalies are computed from the JMA climatology (1961-1990). Contour interval is 1°C and additional anomaly contours of 0.5°C are shown by broken lines. Negative anomalies are spotted.



第5図　日本近海表層水温図(深さ100m)(1998年 7月)

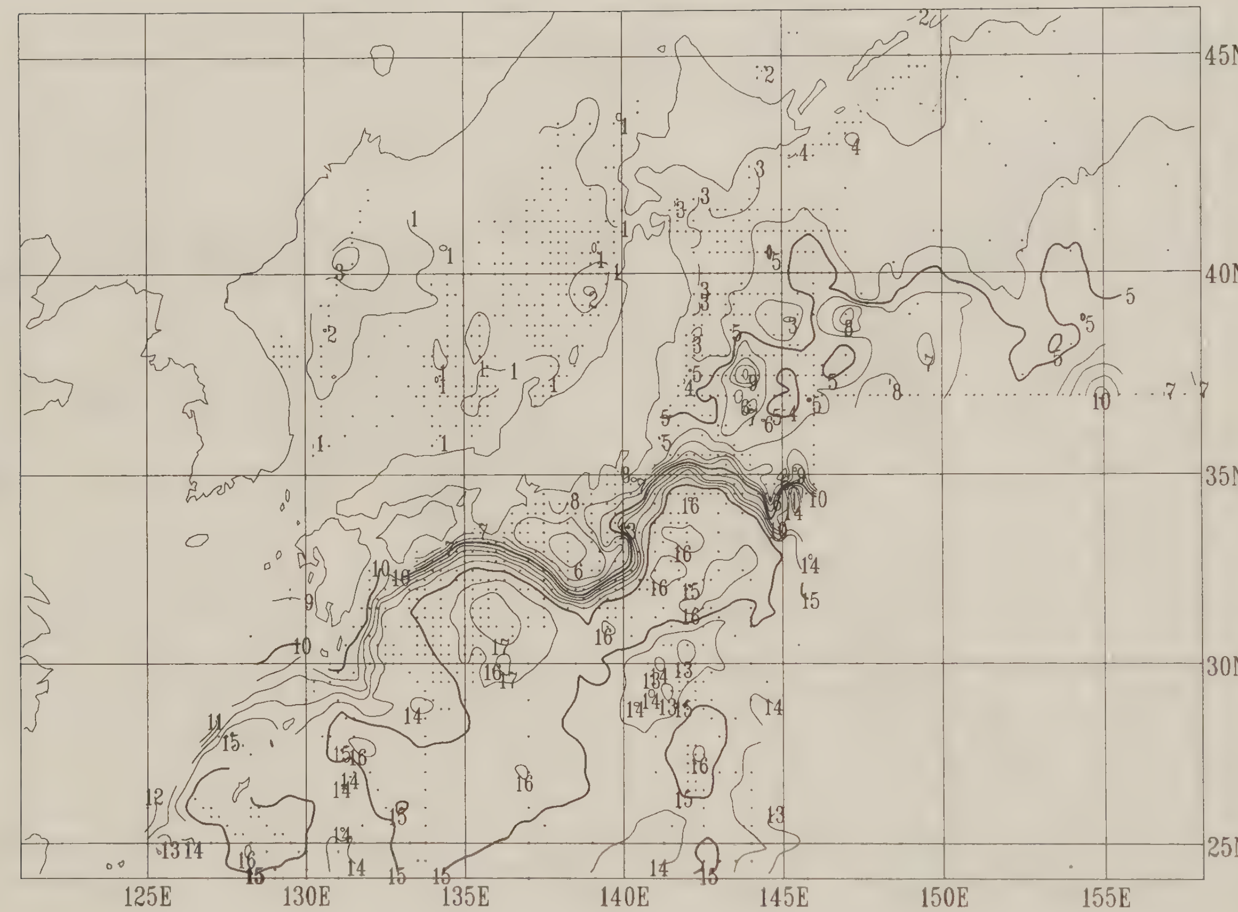
Fig.5 Subsurface (100m) temperatures in the seas adjacent to Japan for JUL 1998. Contour interval is 1°C. Observation points are denoted by dots.

200m Temperatures in the Seas Adjacent to Japan



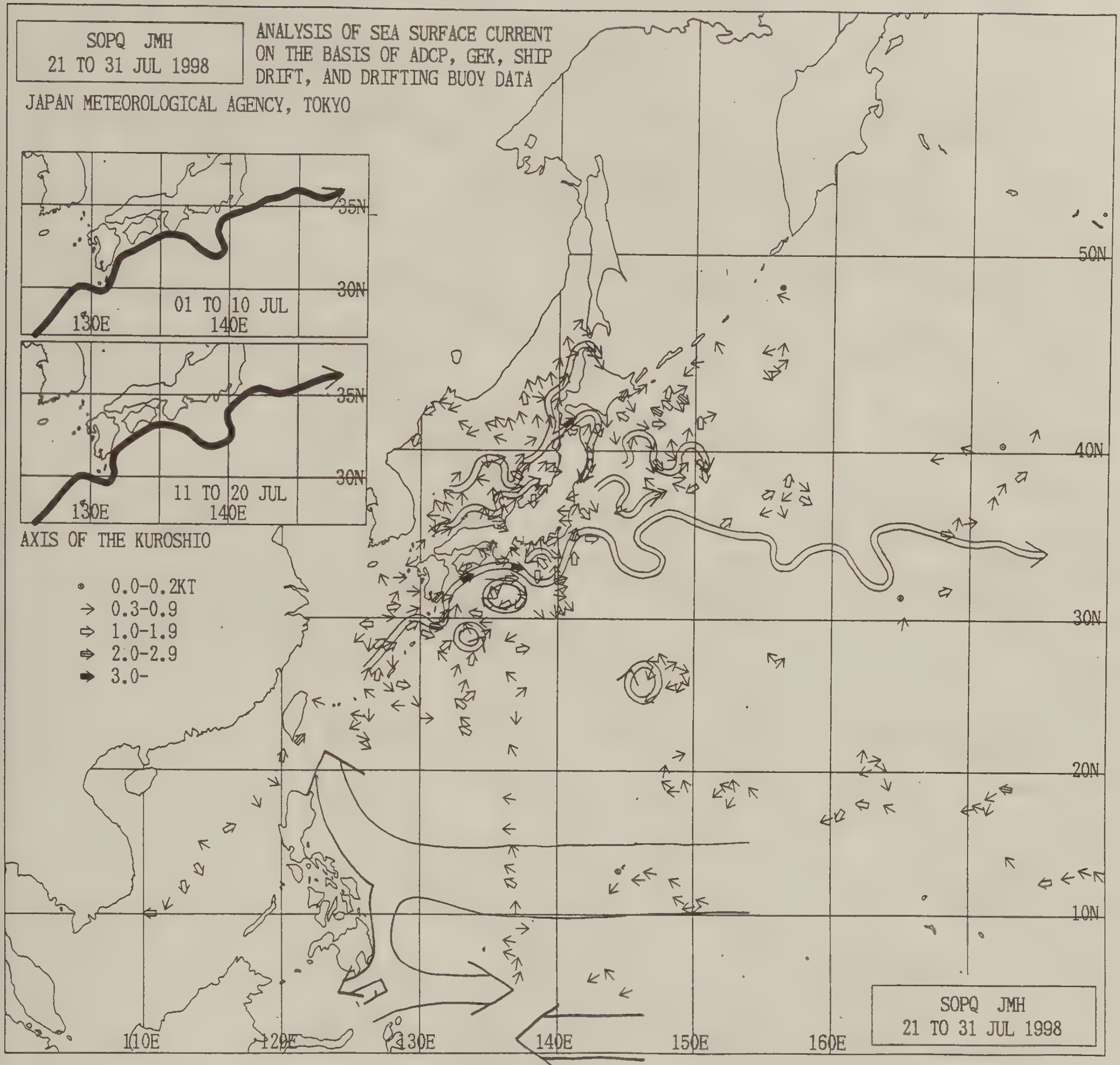
第6図　日本近海表層水温図(深さ200m) (1998年 7月)

Fig.6 Subsurface (200m) temperatures in the seas adjacent to Japan for JUL 1998. Contour interval is 1°C. Observation points are denoted by dots.



第7図　日本近海表層水温図(深さ400m) (1998年 7月)

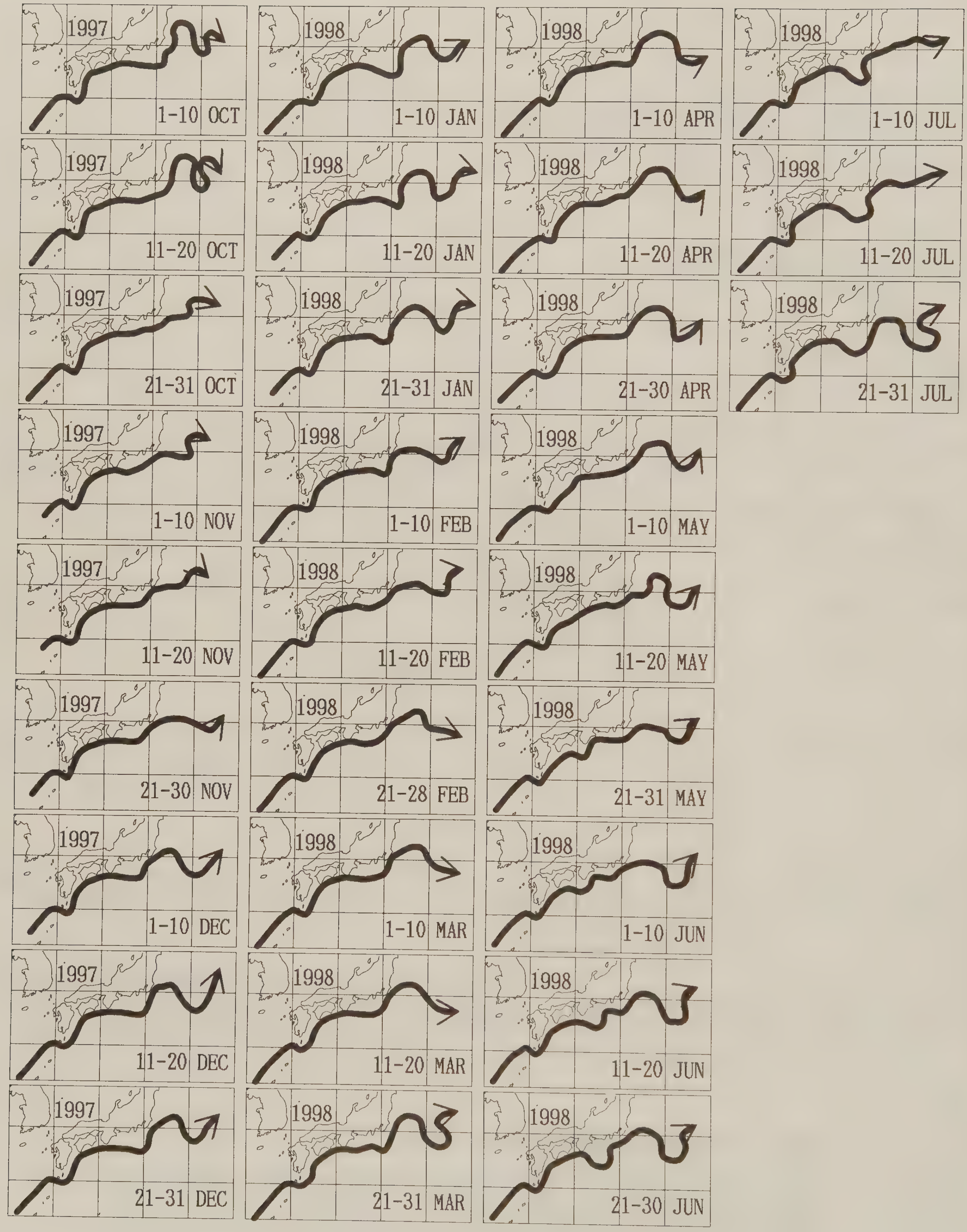
Fig.7　Subsurface (400m) temperatures in the seas adjacent to Japan for JUL 1998.　Contour interval is 1°C.　Observation points are denoted by dots.



第8図　北西太平洋海流図（1998年 7月下旬）

Fig.8 Analysis of the sea surface current in the western North Pacific for the 3rd ten-day period in JUL 1998. Small arrows indicate in situ observations. Major currents such as the Kuroshio and the North Equatorial Current are denoted by larger open arrows.

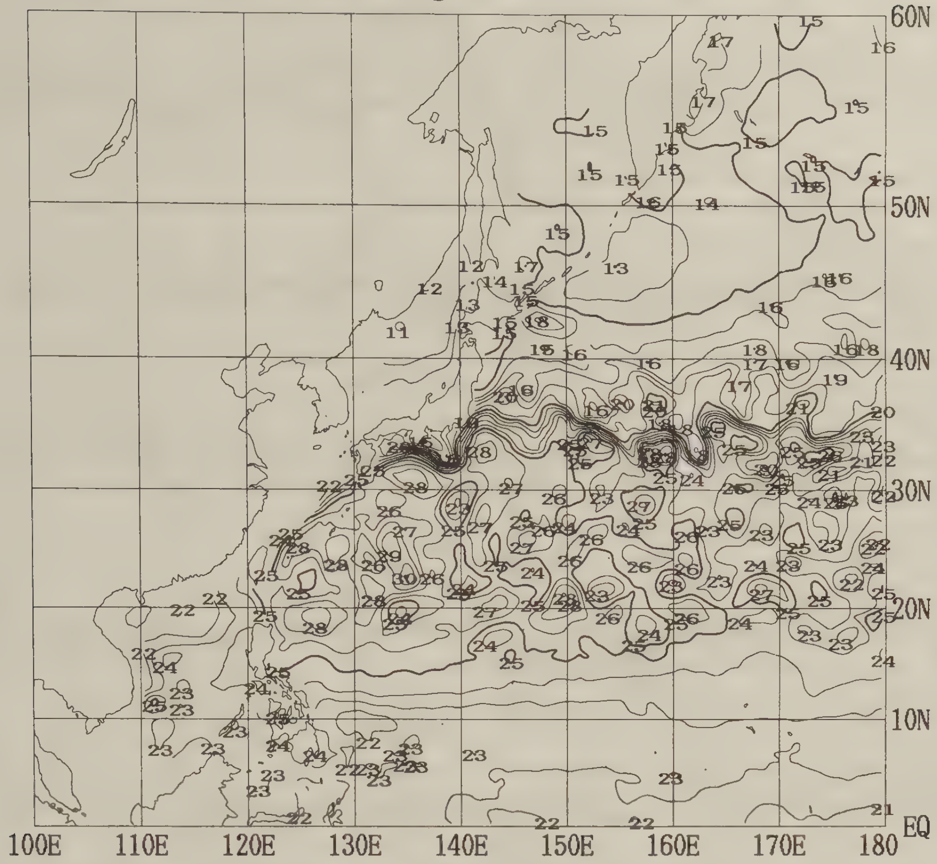
Location of the Kuroshio axis



第9図 旬別黒潮流軸図

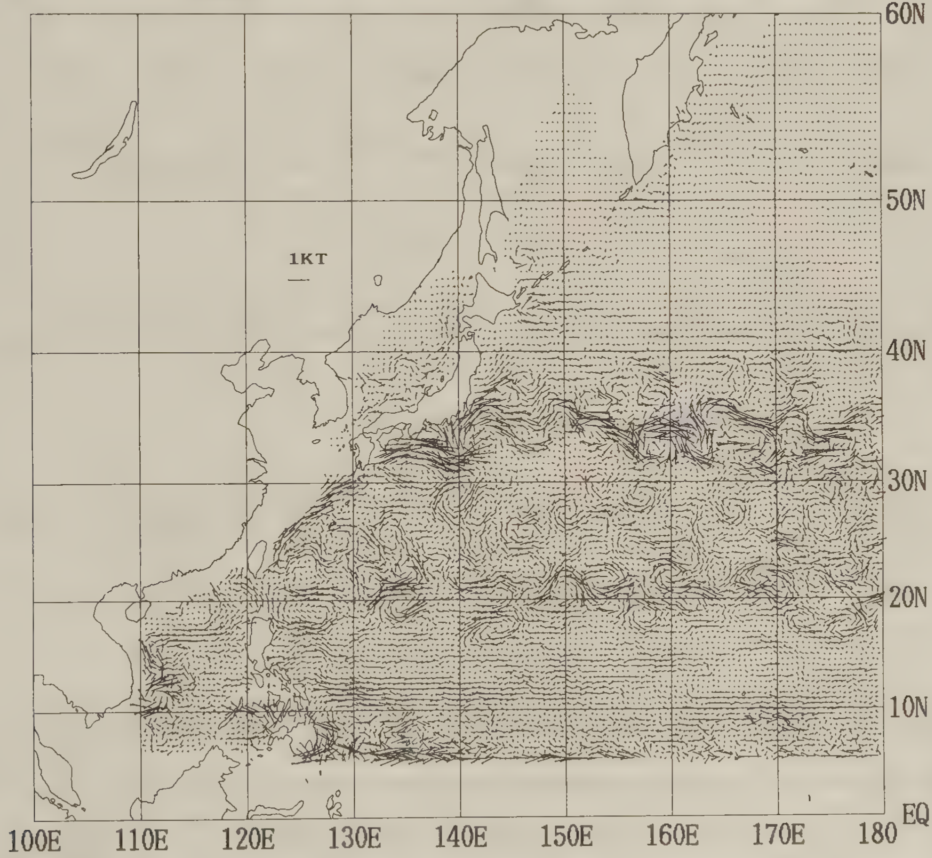
Fig.9 Location of the Kuroshio axis

Sea surface dynamic heights and current distribution



第10図 北西太平洋力学的海面高度分布図(1998年 7月20日)

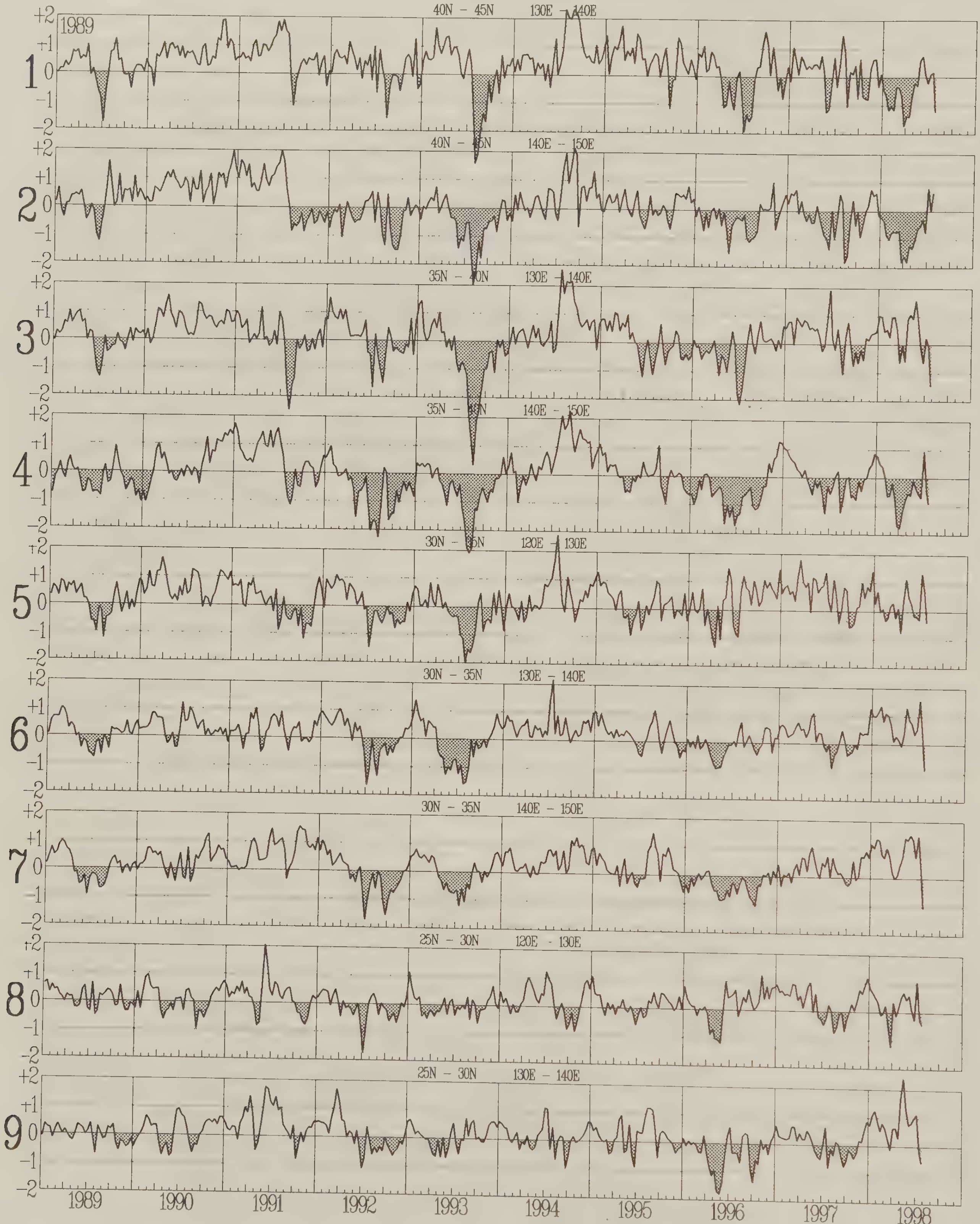
Fig.10 Sea surface dynamic heights (10cm) in the western North Pacific derived from the altimeter data of TOPEX/POSEIDON (JUL 20, 1998).
1500db surface is assumed to be the surface of no motion.



第11図 北西太平洋海流ベクトル図(1998年 7月20日)

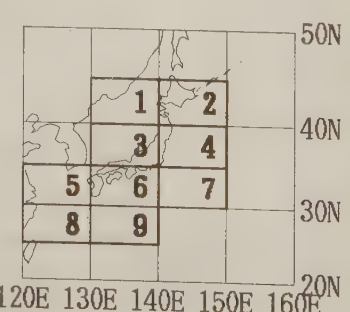
Fig.11 Sea surface current vectors in the western North Pacific (JUL 20, 1998).
Vectors are derived from the sea surface dynamic heights from TOPEX/POSEIDON and subsurface temperature distribution assuming the geostrophic relation.

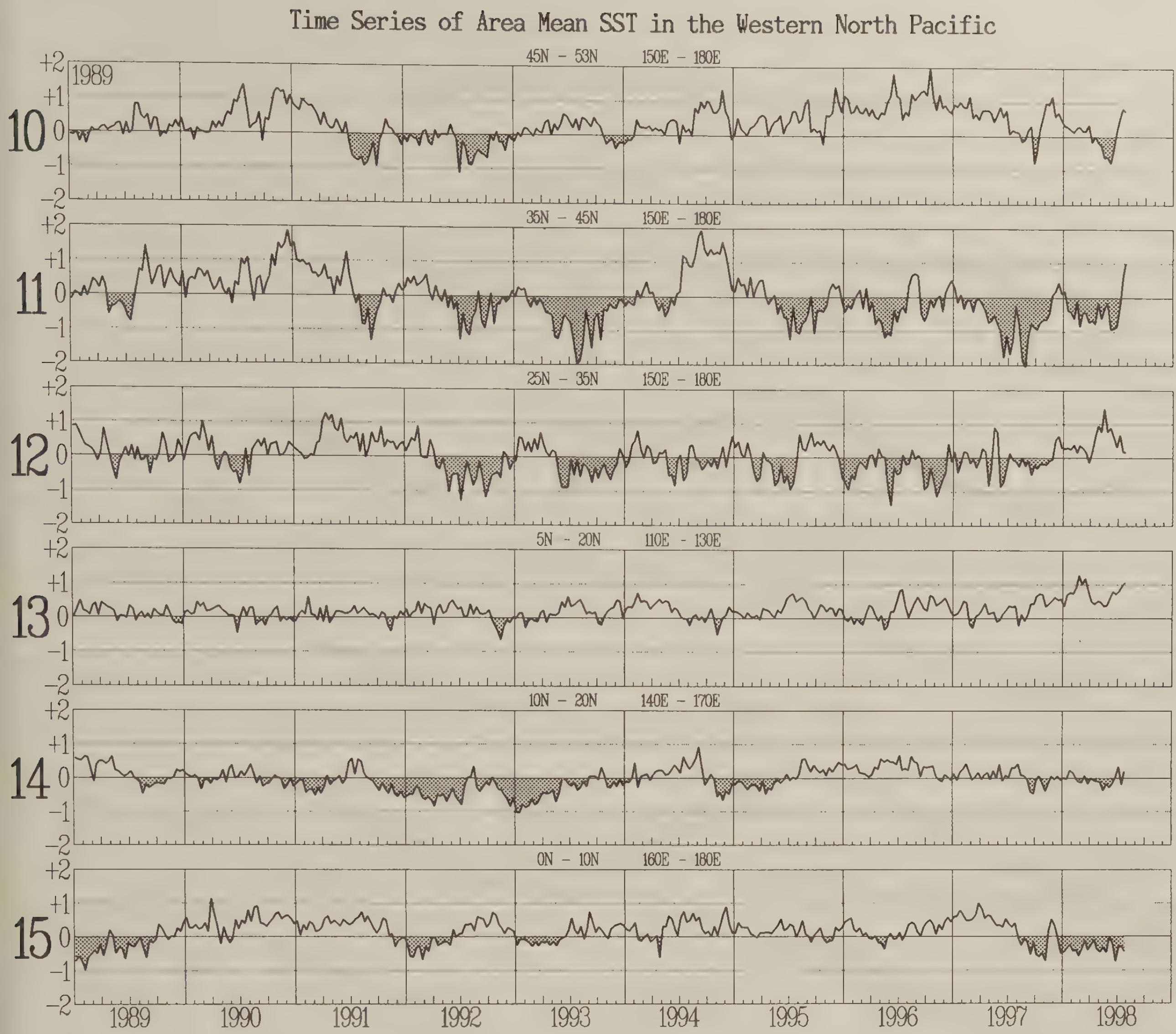
Time Series of Area Mean SST in the Western North Pacific



第12図　海域別旬平均海面水温平年偏差時系列図

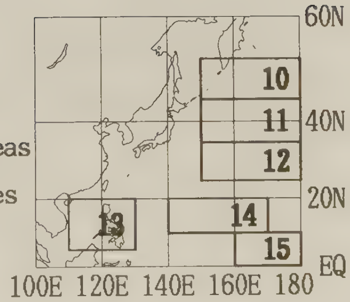
Fig.12 Time series of the ten-day mean sea surface temperature anomalies (°C) in the western North Pacific for the areas shown in the right panel. Negative anomalies are shaded. Anomalies are computed from the JMA climatology (1961-90).

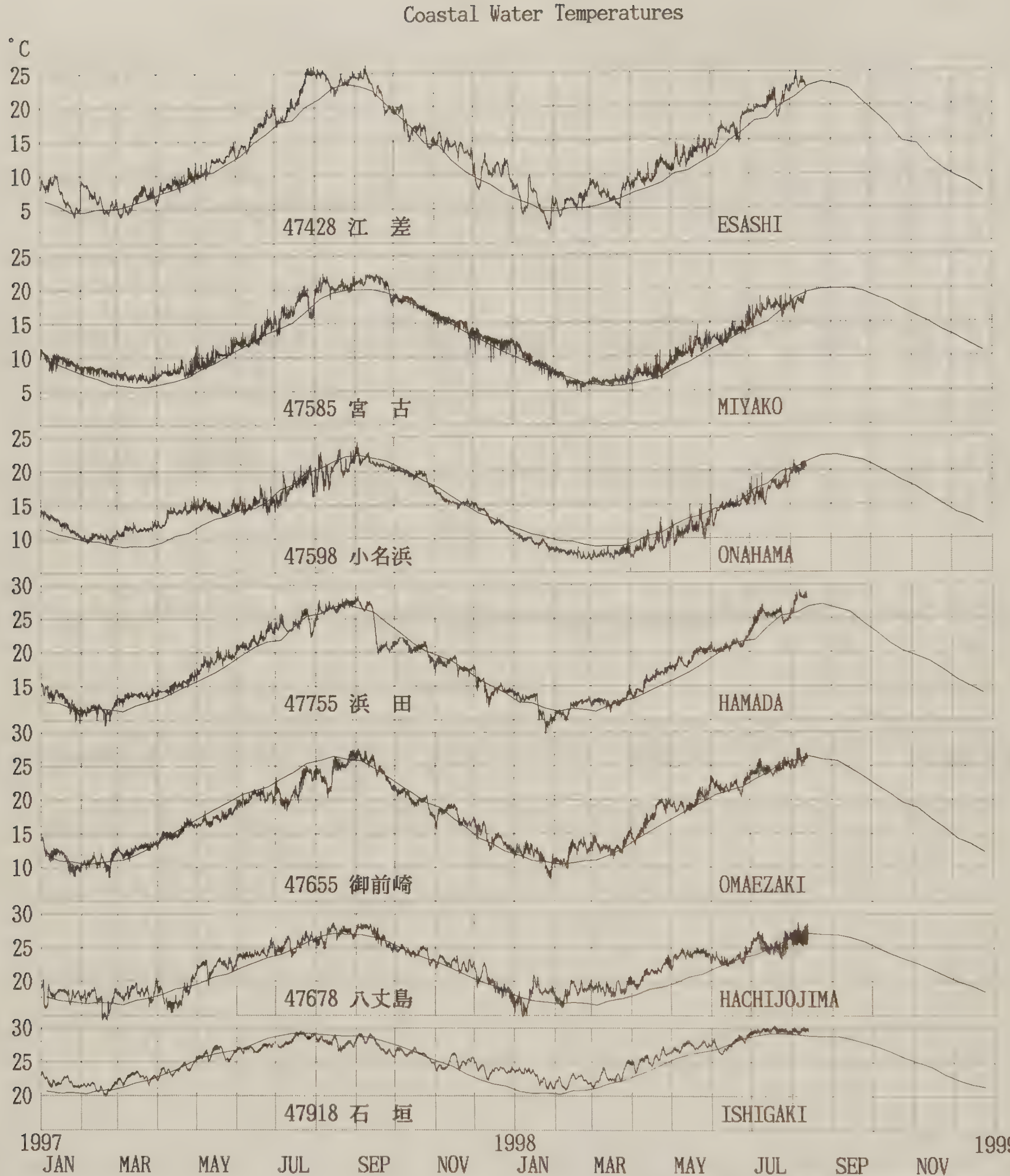


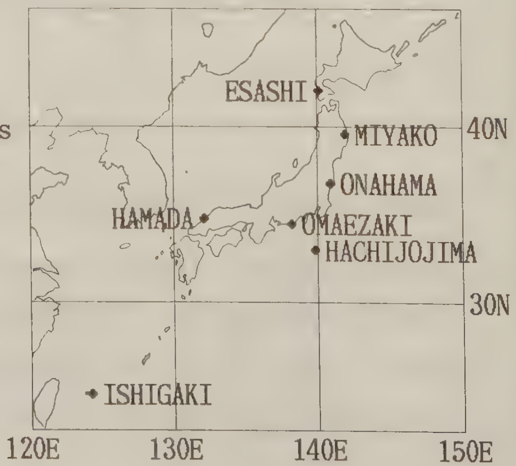


第12図　海域別旬平均海面水温平年偏差時系列図（つづき）

Fig.12 (continue) Time series of the ten-day mean sea surface temperature anomalies (°C) in the western North Pacific for the areas shown in the right panel. Negative anomalies are shaded. Anomalies are computed from the JMA climatology (1961-90).



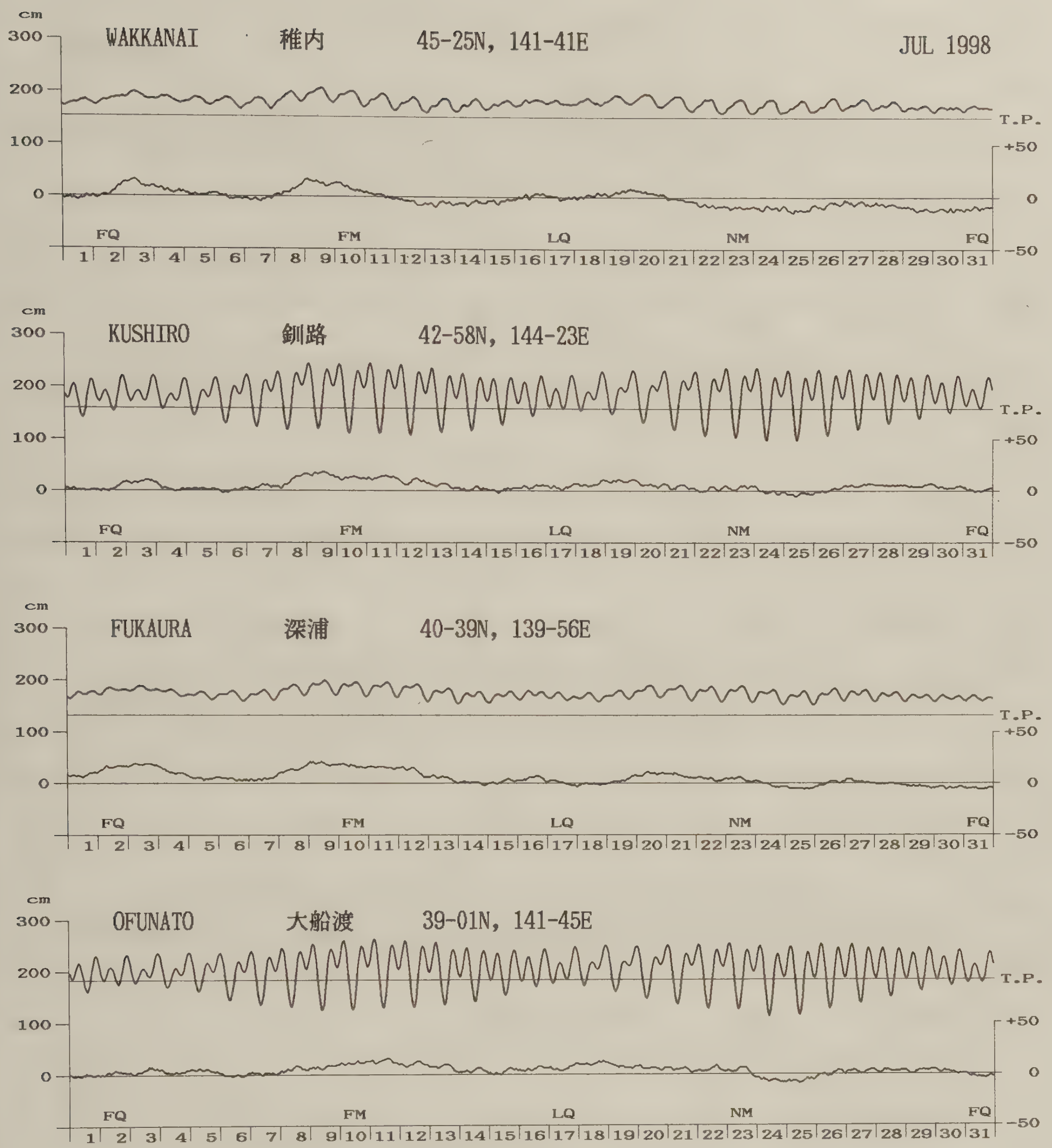




第13図 沿岸水温時系列図

Fig.13 Time series of hourly coastal water temperatures (°C) measured at 7 coastal stations of the JMA shown in the right panel.
Thin lines show ten-day mean climatology.

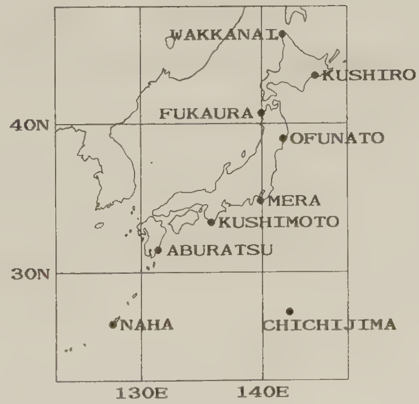
Time Series of Sea Level

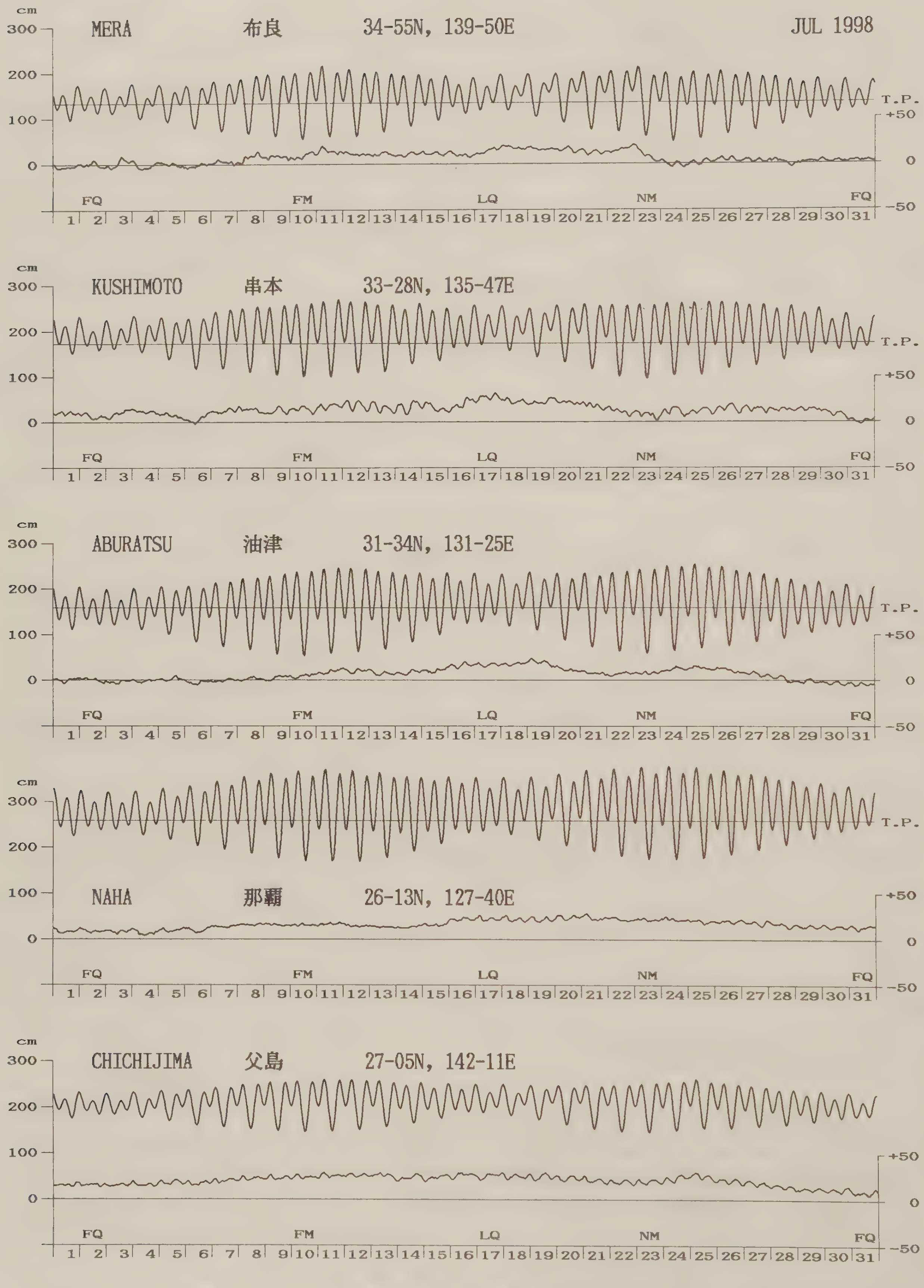


第14図 沿岸潮位時系列図（1998年 7月）

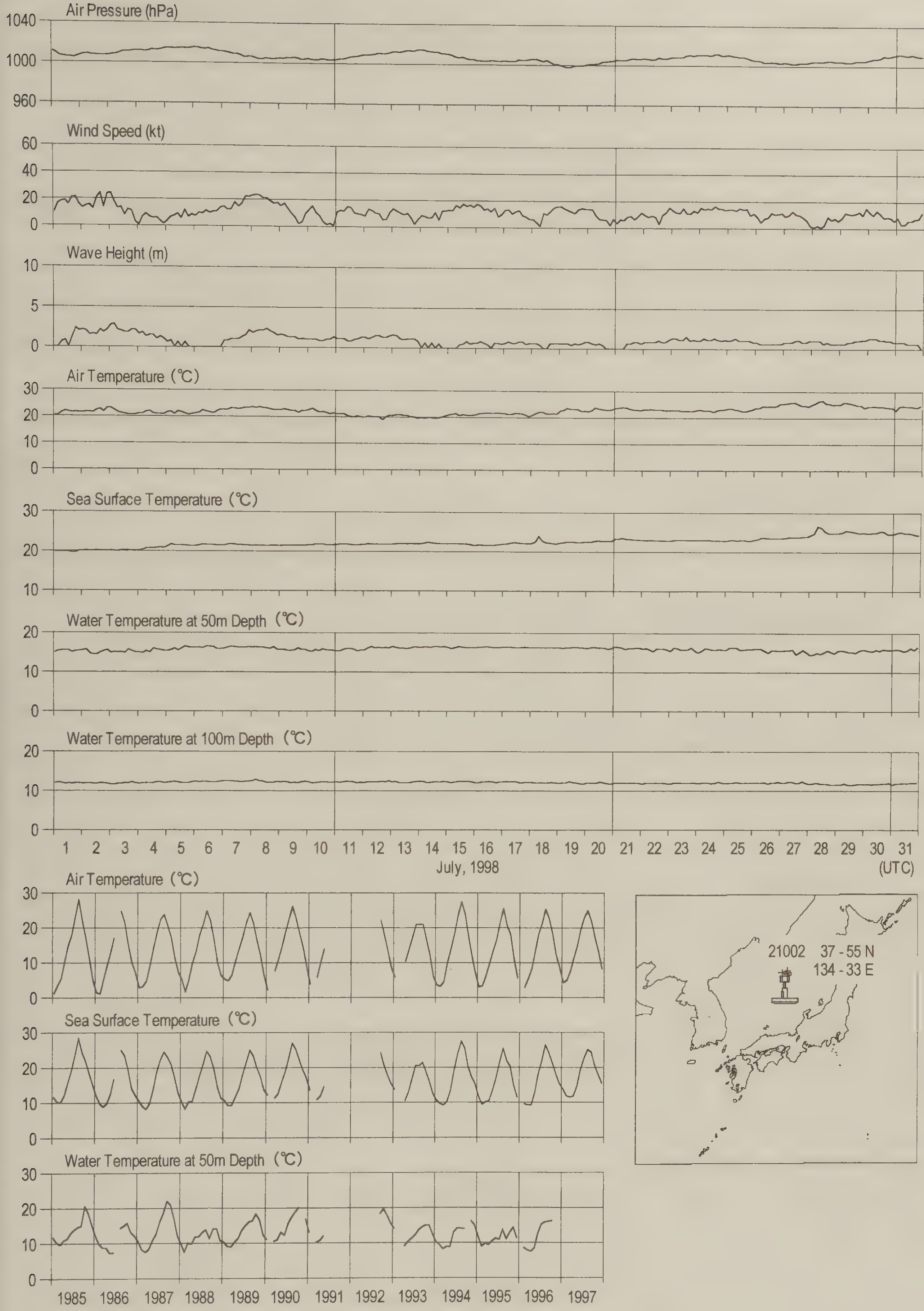
Fig.14 Time series of hourly sea level observation (upper line) and its anomalies (lower line) at 9 stations of the JMA in the right panel.
Short term variations are removed from raw data.

FM: full moon, FQ: first quarter
NM: new moon, LQ: last quarter
T.P.: Mean sea level of Tokyo Bay (Tokyo Peil)



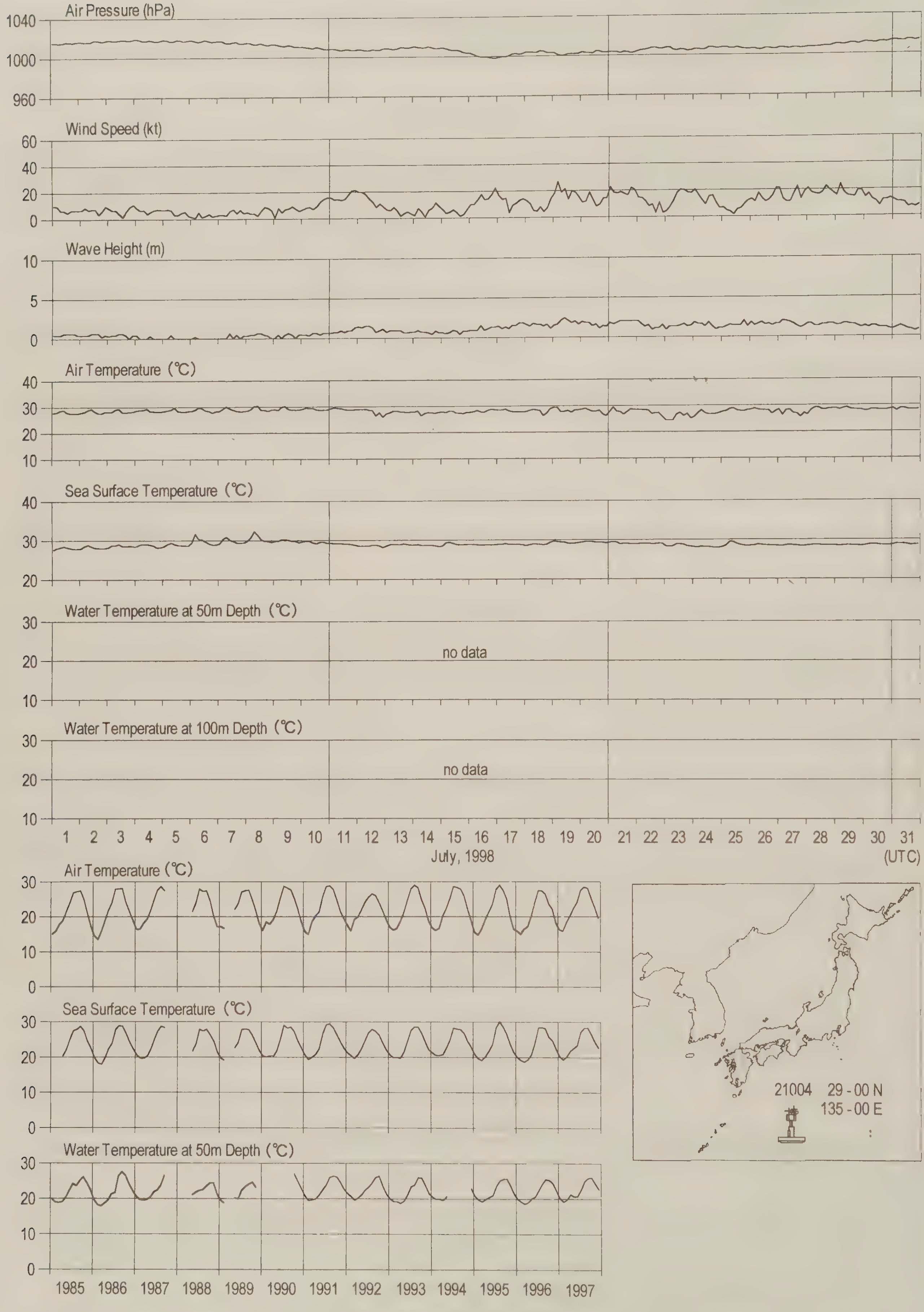


第14図 つづき
Fig.14 continue



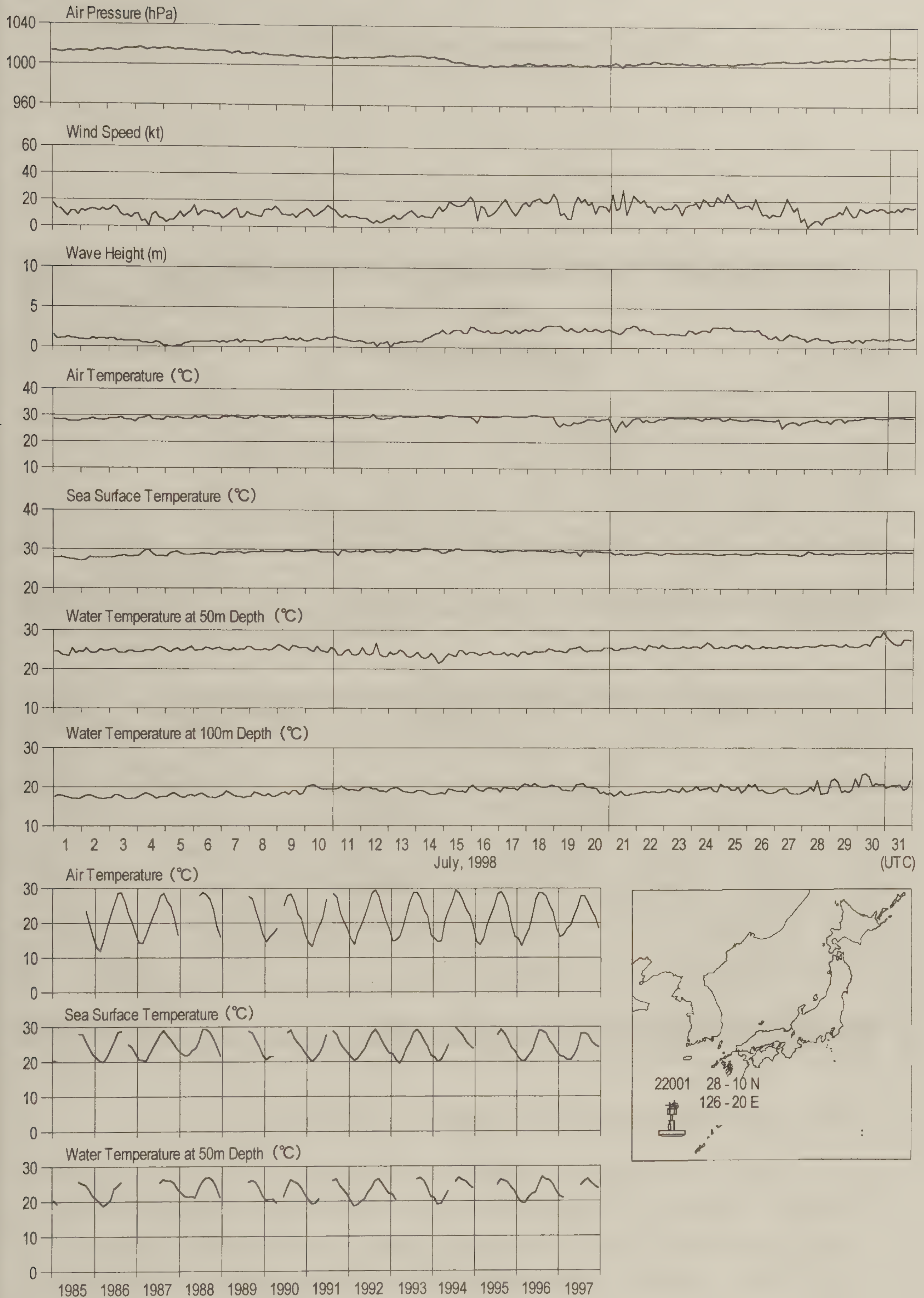
第15図　海洋気象ブイロボットによる観測要素の時系列図（日本海：21002）
上段は３時間毎の観測値を、下段は月平均値を示す。

Fig. 15　Time series of JMA buoy observation in the Japan Sea (WMO ID No. 21002). The upper panel shows three hourly observation and the lower panel shows the monthly mean data.



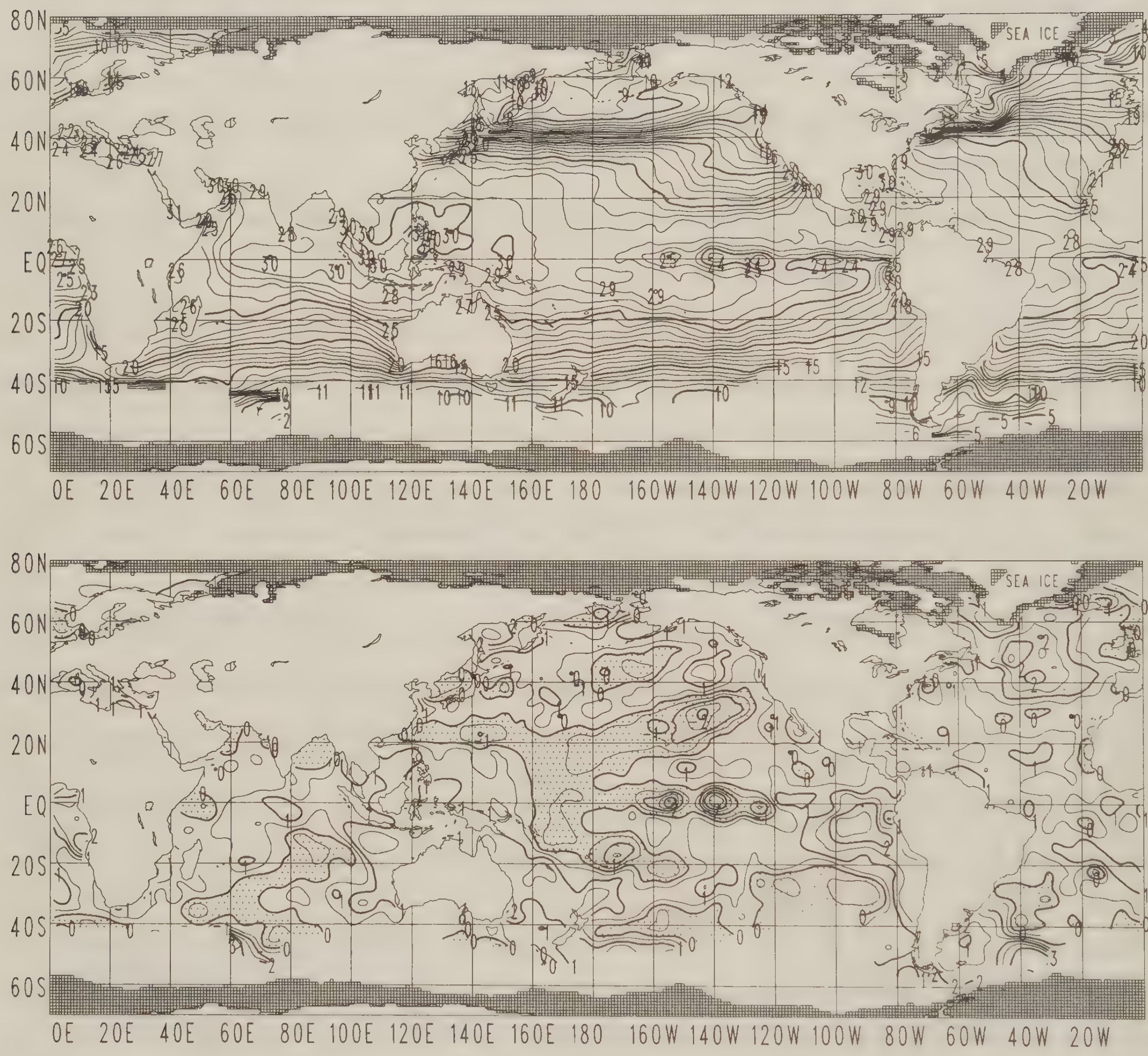
第15図　海洋気象ブイロボットによる観測要素の時系列図（四国沖：21004）
上段は３時間毎の観測値を、下段は月平均値を示す。

Fig. 15　Time series of JMA buoy observation south of Shikoku (WMO ID No. 21004).
The upper panel shows three hourly observation and the lower panel shows the monthly mean data.



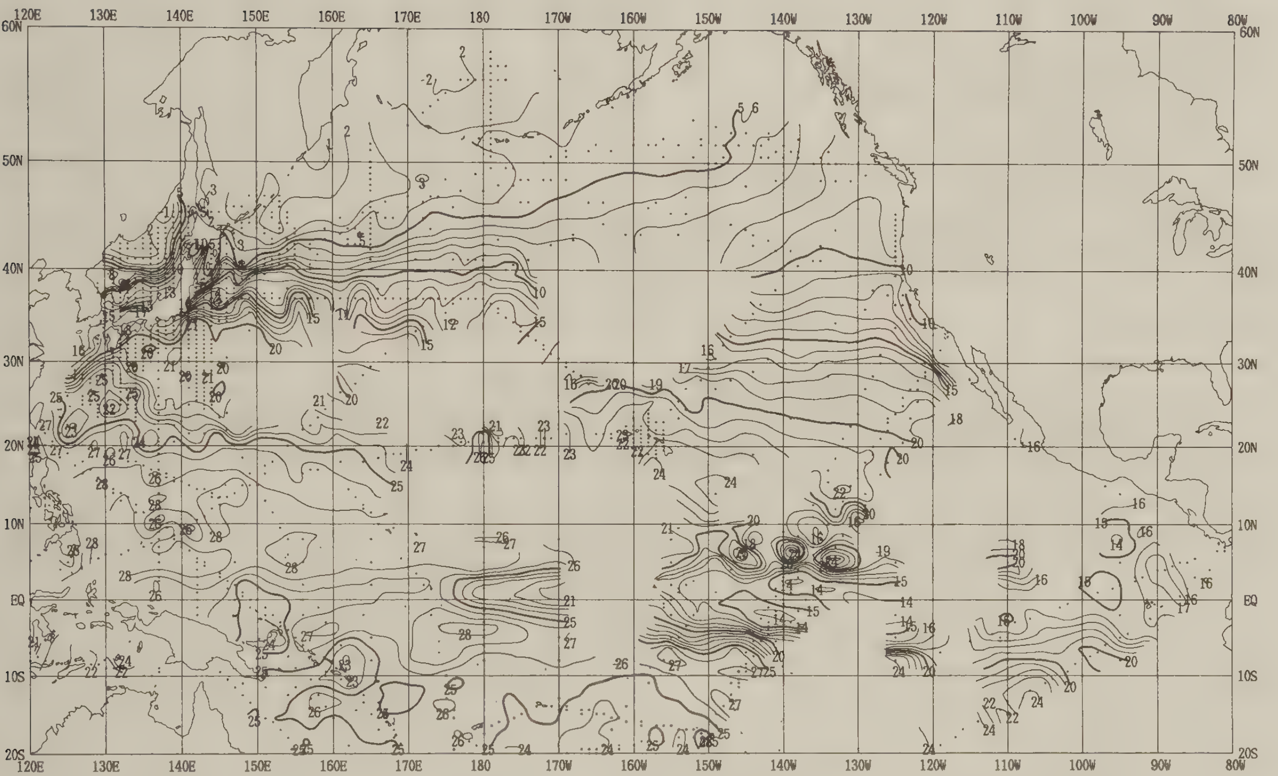
第15図　海洋気象ブイロボットによる観測要素の時系列図（東シナ海：22001）
上段は３時間毎の観測値を、下段は月平均値を示す。

Fig. 15　Time series of JMA buoy observation in the East China Sea (WMO ID No. 22001). The upper panel shows three hourly observation and the lower panel shows the monthly mean data.



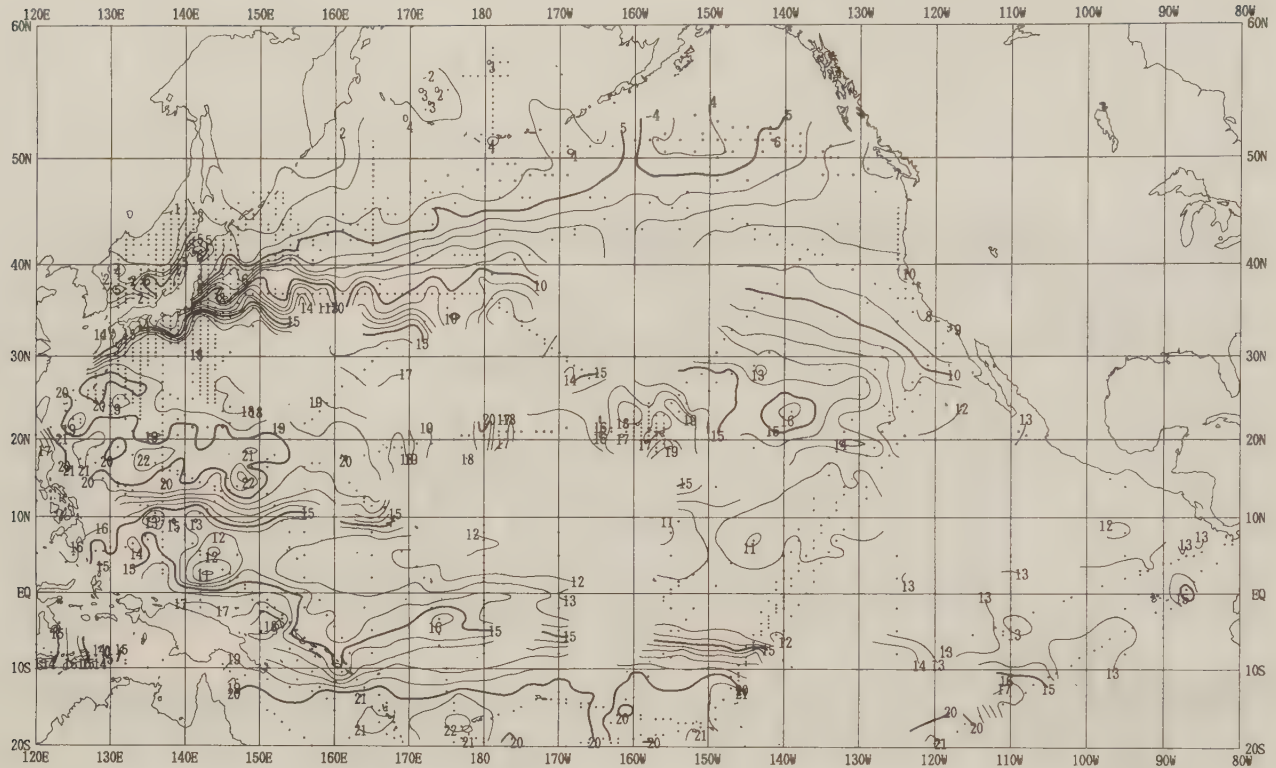
第16図　全球月平均海面水温図（上）及び偏差図（下）（1998年 7月）

Fig.16 Monthly mean sea surface temperature over the global ocean (top) and anomalies (bottom) for JUL 1998. Anomalies are computed from the JMA climatology (1961-1990). Contour interval is 1°C (top) and additional anomaly contours of ±0.5°C are shown by thin lines. Negative anomalies are spotted. Maximum coverage of sea ice is shaded. Data sources for sea ice are U.S. National Ice Center (polar regions) and JMA (the Sea of Okhotsk).



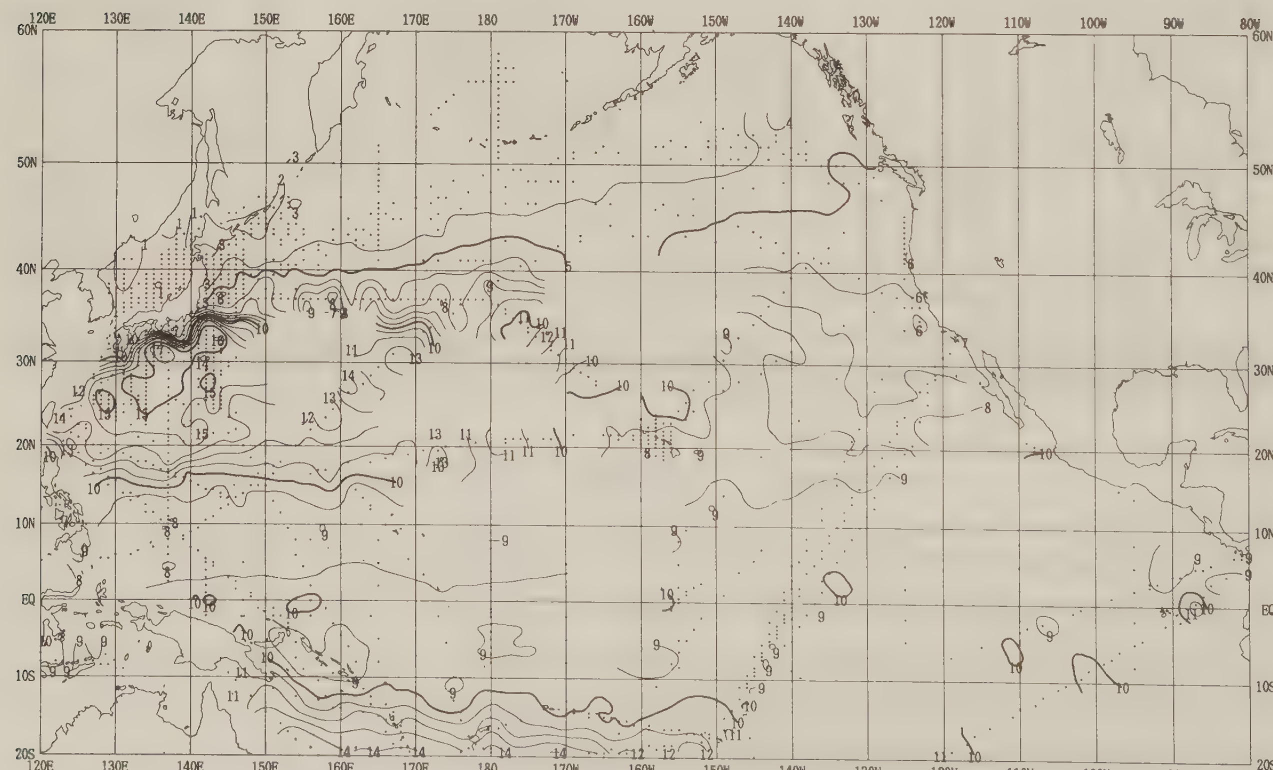
第17図　太平洋表層水温図(深さ100m)（1998年 7月）

Fig.17 Subsurface (100m) temperatures in the Pacific Ocean for JUL 1998.
Contour interval is 1°C. Observation points are denoted by dots.



第18図　太平洋表層水温図(深さ200m) (1998年 7月)

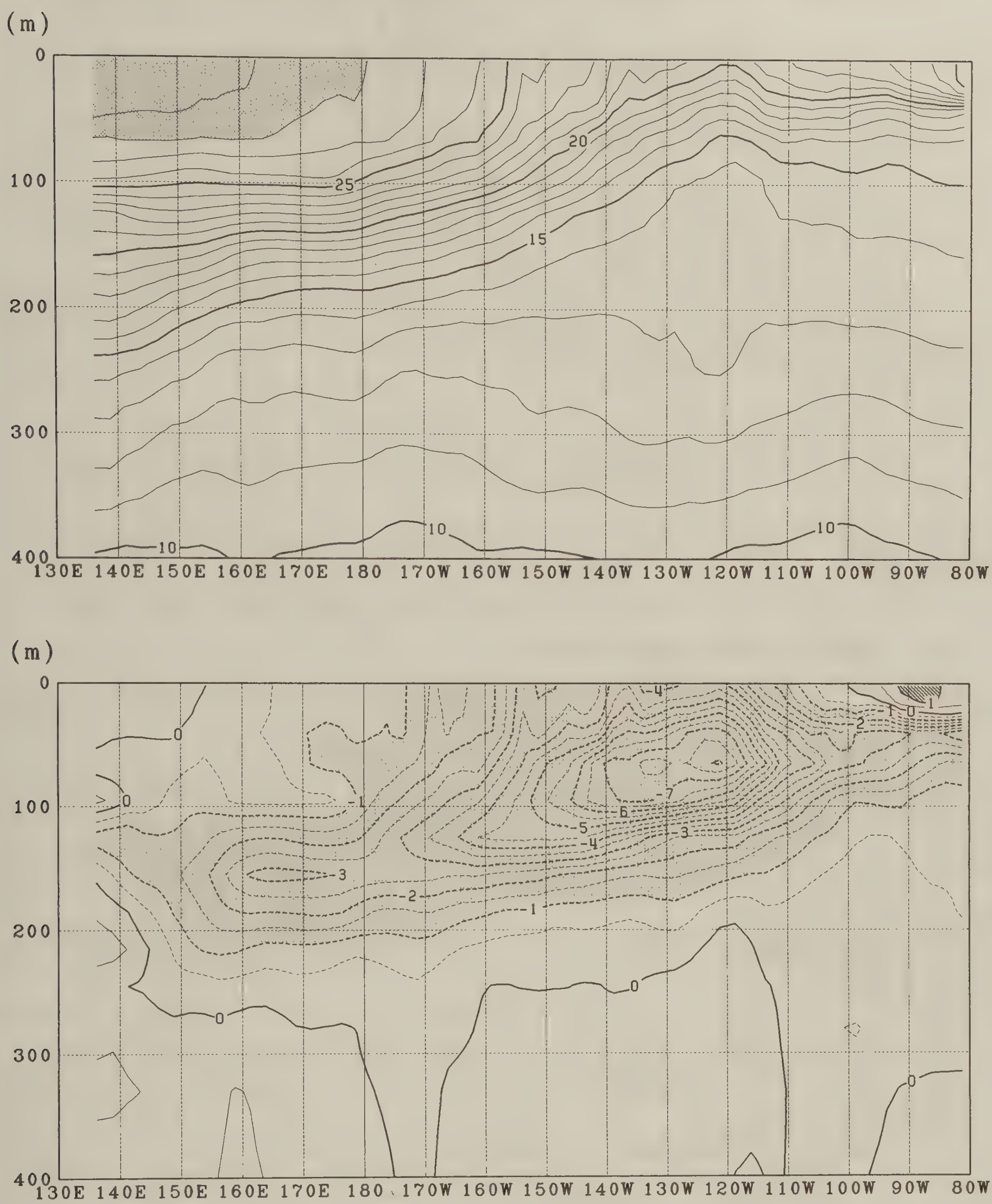
Fig.18 Subsurface (200m) temperatures in the Pacific Ocean for JUL 1998. Contour interval is 1°C. Observation points are denoted by dots.



第19図　太平洋表層水温図(深さ400m) (1998年 7月)

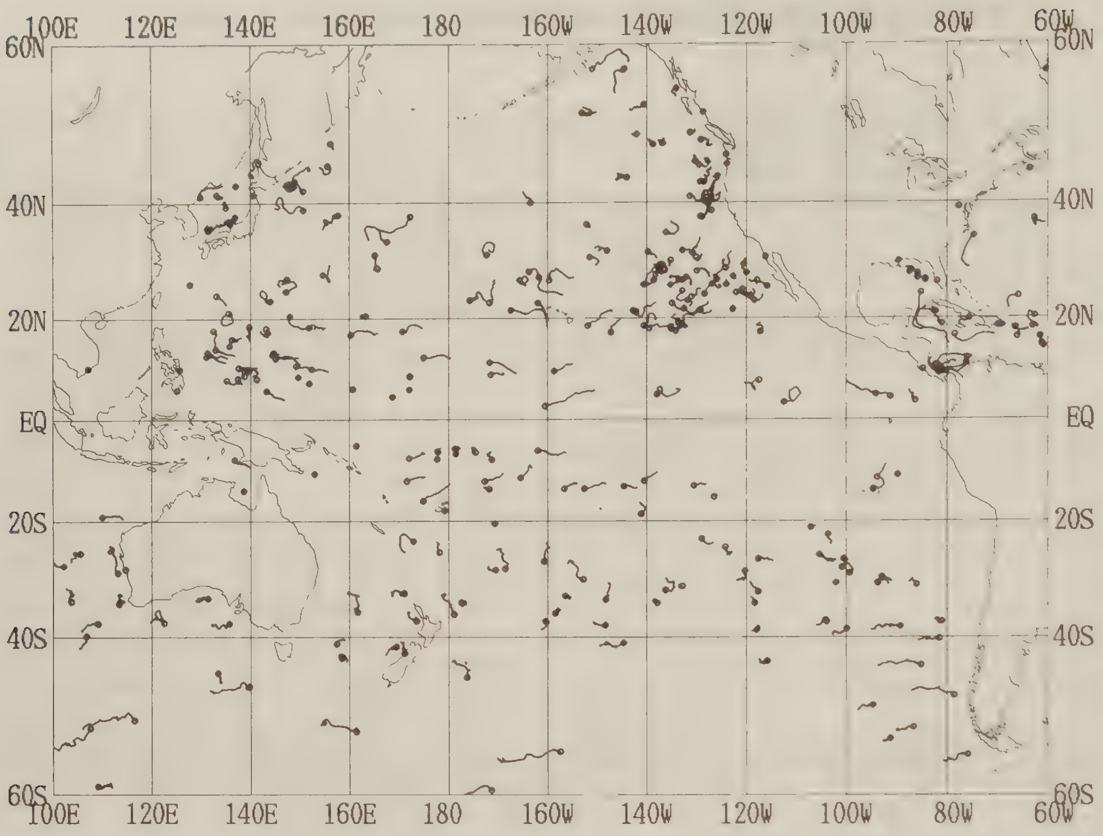
Fig.19 Subsurface (400m) temperatures in the Pacific Ocean for JUL 1998. Contour interval is 1°C. Observation points are denoted by dots.

Depth-Longitude Sections of Equatorial Temperature & Anomalies



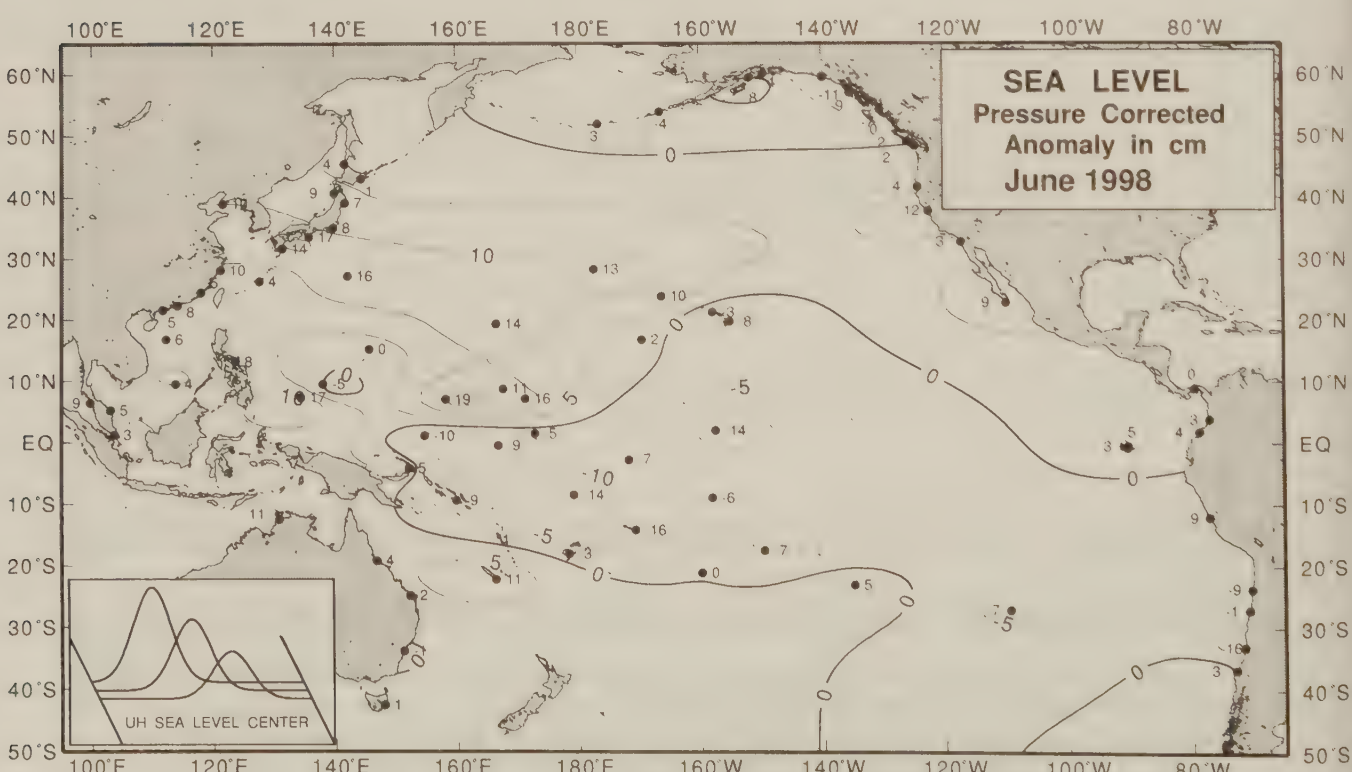
第20図　太平洋赤道に沿う表層水温（上）及び偏差（下）の深度－経度断面図（1998年 7月）

Fig.20 Depth-longitude sections of temperature (top) and anomalies (bottom) along the equator in the Pacific Ocean for JUL 1998. Data are derived from the Ocean Data Assimilation System of JMA. Contour interval is 1°C (top) and 0.5°C (bottom). Values greater than 28°C in the top panel are shaded. In the bottom panel, values greater than 1°C are shaded and values less than -1°C are spotted. Anomalies are computed from 1987-1997 base period means.



第21図　太平洋ブイ流跡図(1998年 7月)

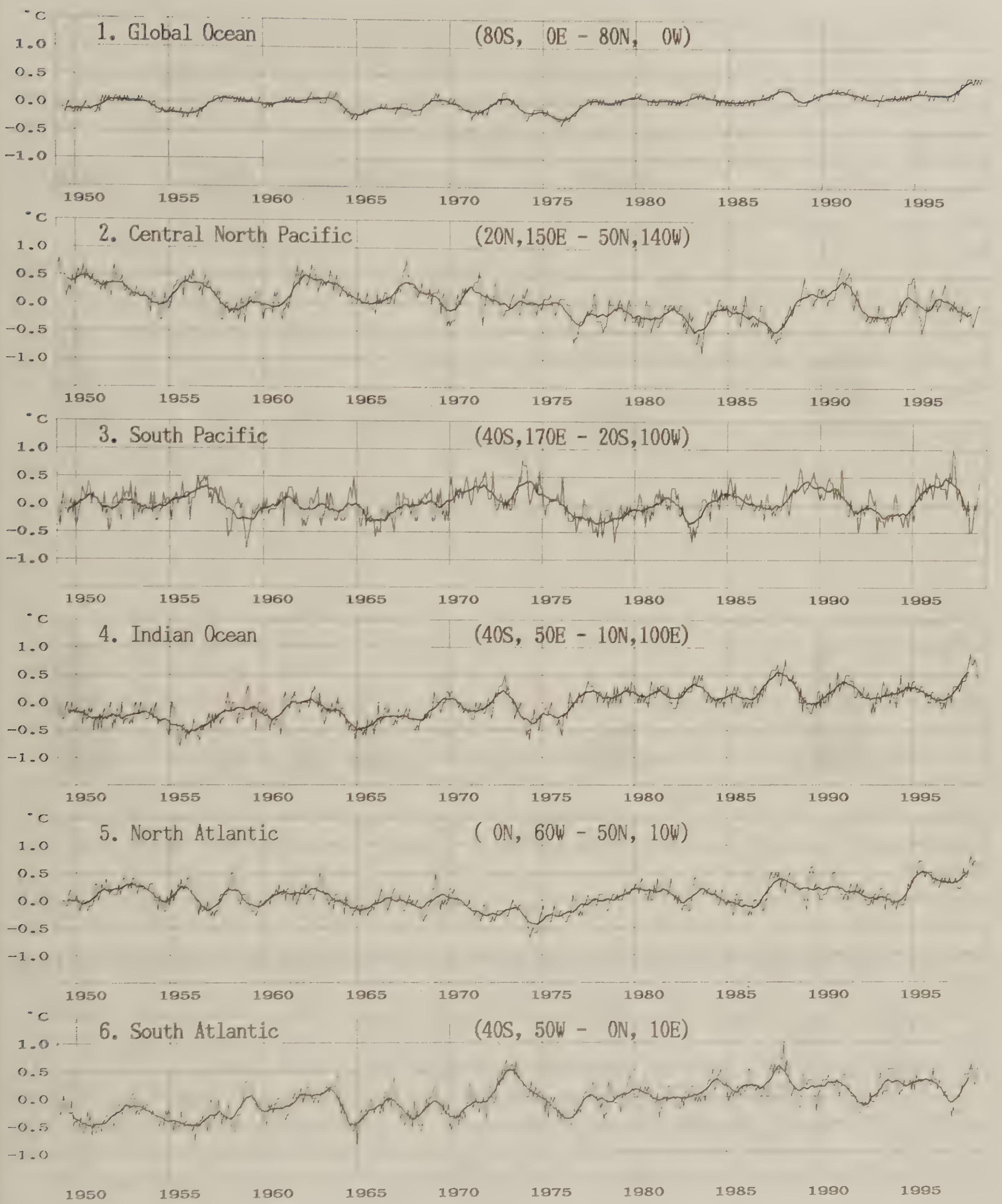
Fig.21　Movements of drifting buoys in the Pacific Ocean during JUL 1998.
Each track is for one buoy.　Small circles represent last positions for the month.



第22図　太平洋海面水位偏差図 (1998年 6月)

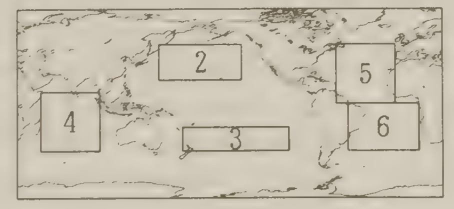
Fig.22　Monthly sea level anomalies for JUN 1998 obtained from mean sea level (1975-1995) adjusted for atmospheric pressure.　This figure is prepared by the SOC of ISLP-PAC, Dept. of Oceanography, Univ. of Hawaii.

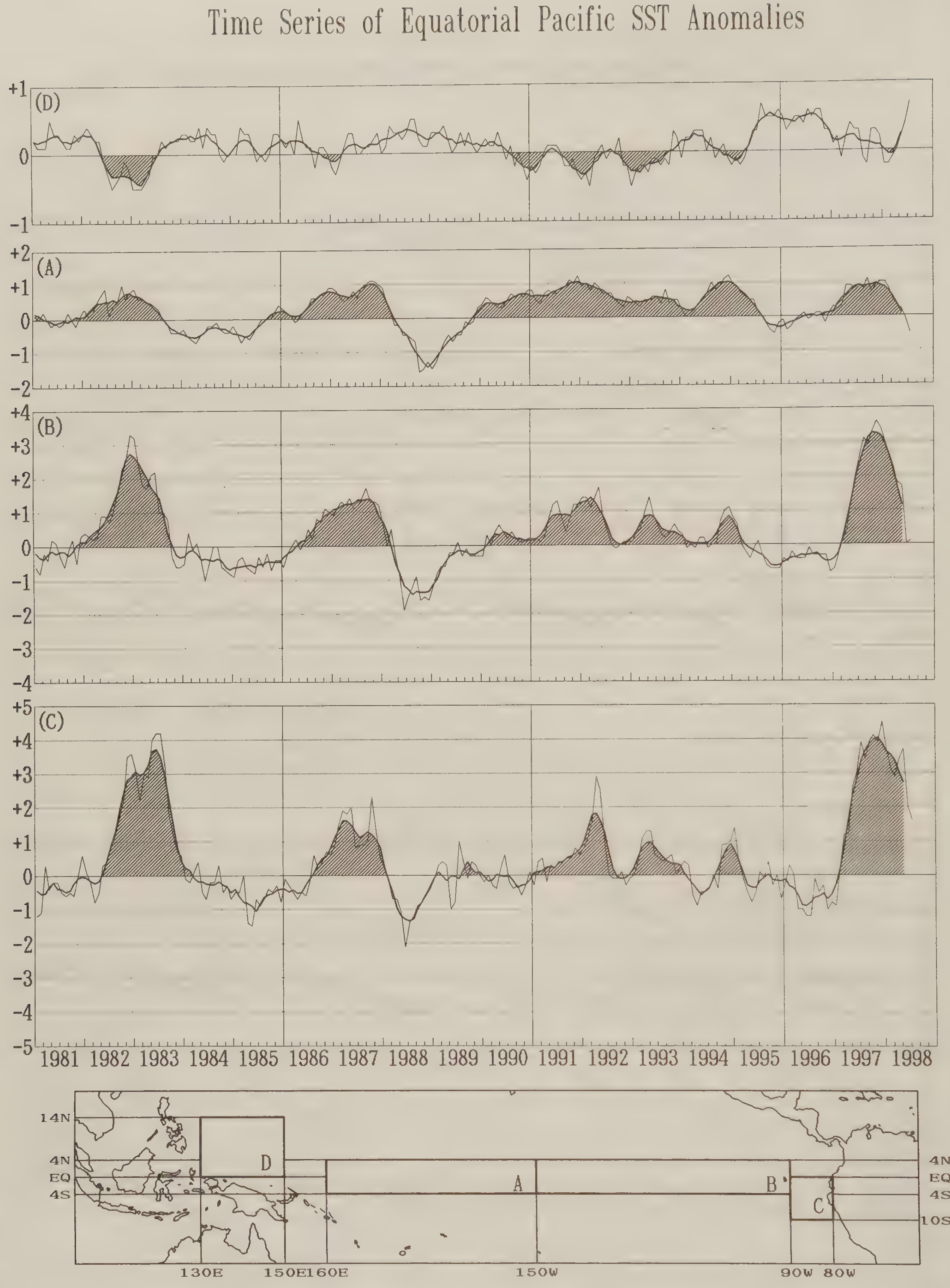
Long-term Variation of Monthly Mean SST Anomalies



第23図 海域平均海面水温偏差の長期変動

Fig.23 Long-term variations of monthly mean sea surface temperature anomalies (°C) for the areas shown in the right panel. Anomalies are computed from the JMA climatology (1961-90). Thin lines show the monthly mean and thick lines their 13-month running means.





第24図　太平洋赤道域の海面水温偏差時系列図

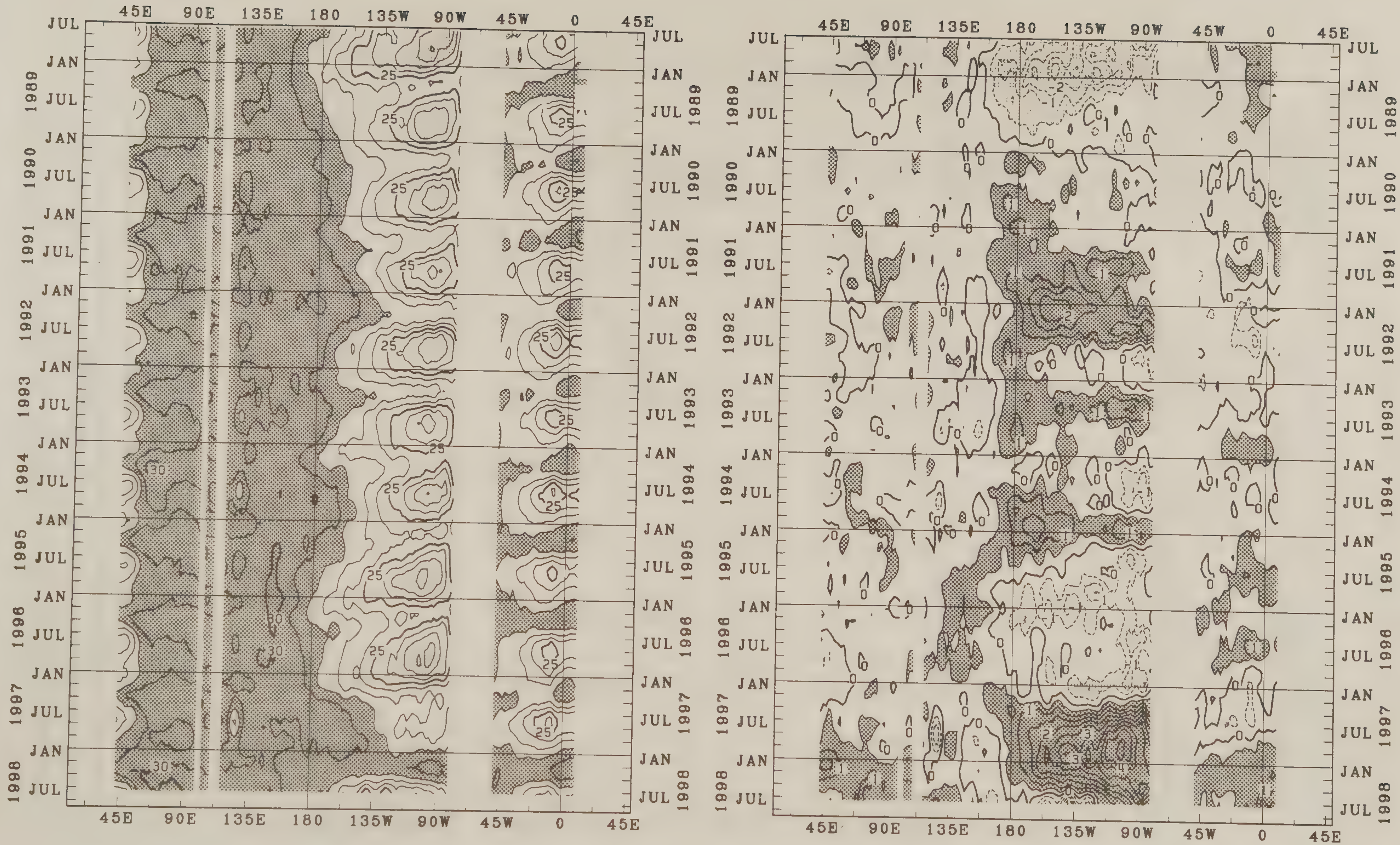
Fig.24 Time series of monthly mean SST anomalies (°C) in the equatorial Pacific Ocean for the areas indicated at the bottom panel. Thin lines show the monthly means and thick lines their 5-month running means. Positive anomalies (A, B, C) and negative anomalies (D) are shaded. Anomalies are computed from the JMA climatology (1961-1990).

El Nino Monitoring Indices

	SEA SURFACE TEMPERATURE AND ANOMALY (°C)								SOI	SEA LEVEL PRESSURE ANOMALY (hPa)	
MONTH	REGION D 14N-EQ 130E-150E		REGION A 4N-4S 160E-150W		REGION B 4N-4S 150W-90W		REGION C EQ-10S 90W-80W		SOI	TAHITI 17-33S 149-37W	DARWIN 12-24S 130-52E
JAN 96	29.0	0.5	27.9	-0.1	25.0	-0.4	24.1	-0.2	0.8	1.0	-0.7
FEB 96	28.6	0.3	27.6	-0.4	25.7	-0.5	26.0	0.3	0.1	-0.2	-0.5
MAR 96	28.8	0.4	27.8	-0.3	26.7	-0.2	25.9	0.0	0.7	1.0	-0.3
APR 96	29.3	0.5	28.1	-0.1	26.7	-0.4	24.1	-1.0	0.8	0.5	-0.5
MAY 96	29.6	0.5	28.5	0.0	26.2	-0.4	22.9	-1.0	0.3	1.2	1.2
JUN 96	29.7	0.4	28.6	0.1	25.7	-0.4	21.5	-1.2	1.4	1.6	-0.2
JUL 96	29.8	0.6	28.4	-0.1	25.1	-0.1	20.4	-1.2	0.7	0.6	-0.6
AUG 96	29.6	0.5	28.4	0.0	24.3	-0.3	20.5	-0.1	0.4	0.4	-0.3
SEP 96	29.8	0.6	28.4	0.1	24.3	-0.3	19.8	-0.5	0.5	-0.7	-1.7
OCT 96	29.9	0.6	28.5	0.1	24.3	-0.3	20.4	-0.3	0.4	-0.1	-0.8
NOV 96	29.5	0.3	28.2	-0.2	24.3	-0.3	20.5	-1.0	-0.0	-0.5	-0.5
DEC 96	29.2	0.3	28.3	0.1	24.1	-0.8	21.8	-0.8	0.8	-0.3	-1.9
JAN 97	28.6	0.1	28.3	0.3	24.7	-0.7	23.4	-0.9	0.3	1.7	0.9
FEB 97	28.5	0.2	28.2	0.2	25.9	-0.3	25.9	0.2	1.2	1.0	-1.9
MAR 97	28.3	-0.1	28.4	0.3	27.0	0.1	27.1	1.2	-0.6	-0.5	0.9
APR 97	29.0	0.2	29.1	0.9	27.5	0.4	26.3	1.2	-1.1	0.4	2.3
MAY 97	29.5	0.4	29.4	0.9	27.9	1.3	26.5	2.6	-2.5	-2.1	0.9
JUN 97	29.6	0.3	29.3	0.8	28.1	2.0	25.7	3.0	-2.3	-0.8	2.1
JUL 97	29.5	0.3	29.4	0.9	27.8	2.6	25.5	3.9	-0.8	-0.1	1.2
AUG 97	29.0	-0.1	29.2	0.8	27.7	3.1	24.0	3.4	-2.0	-0.9	2.2
SEP 97	29.0	-0.2	29.4	1.1	27.5	2.9	24.2	3.9	-1.4	0.1	2.7
OCT 97	29.6	0.3	29.1	0.7	27.9	3.3	24.8	4.1	-1.6	-0.2	2.7
NOV 97	29.5	0.3	29.3	0.9	28.2	3.6	25.4	3.9	-1.2	0.4	2.7
DEC 97	29.1	0.2	29.2	1.0	28.3	3.4	27.1	4.5	-0.9	-0.5	1.1
JAN 98	28.3	-0.2	29.0	1.0	28.4	3.0	28.0	3.7	-2.3	-3.6	1.4
FEB 98	28.1	-0.2	28.8	0.8	28.8	2.6	28.8	3.1	-1.8	-0.9	3.5
MAR 98	28.3	-0.1	28.6	0.5	29.0	2.1	28.8	2.9	-2.5	-2.8	2.3
APR 98	28.8	0.0	28.5	0.3	28.9	1.8	28.5	3.4	-2.3	-1.5	1.4
MAY 98	29.3	0.2	28.7	0.2	28.3	1.7	27.6	3.7	0.0	0.4	0.5
JUN 98	29.7	0.4	28.4	-0.1	26.1	0.0	24.7	2.0	1.1	0.9	-0.5
JUL 98	29.9	0.7	28.0	-0.5	25.3	0.1	23.2	1.6	1.5	1.8	-0.6

第1表　エルニーニョ監視指数

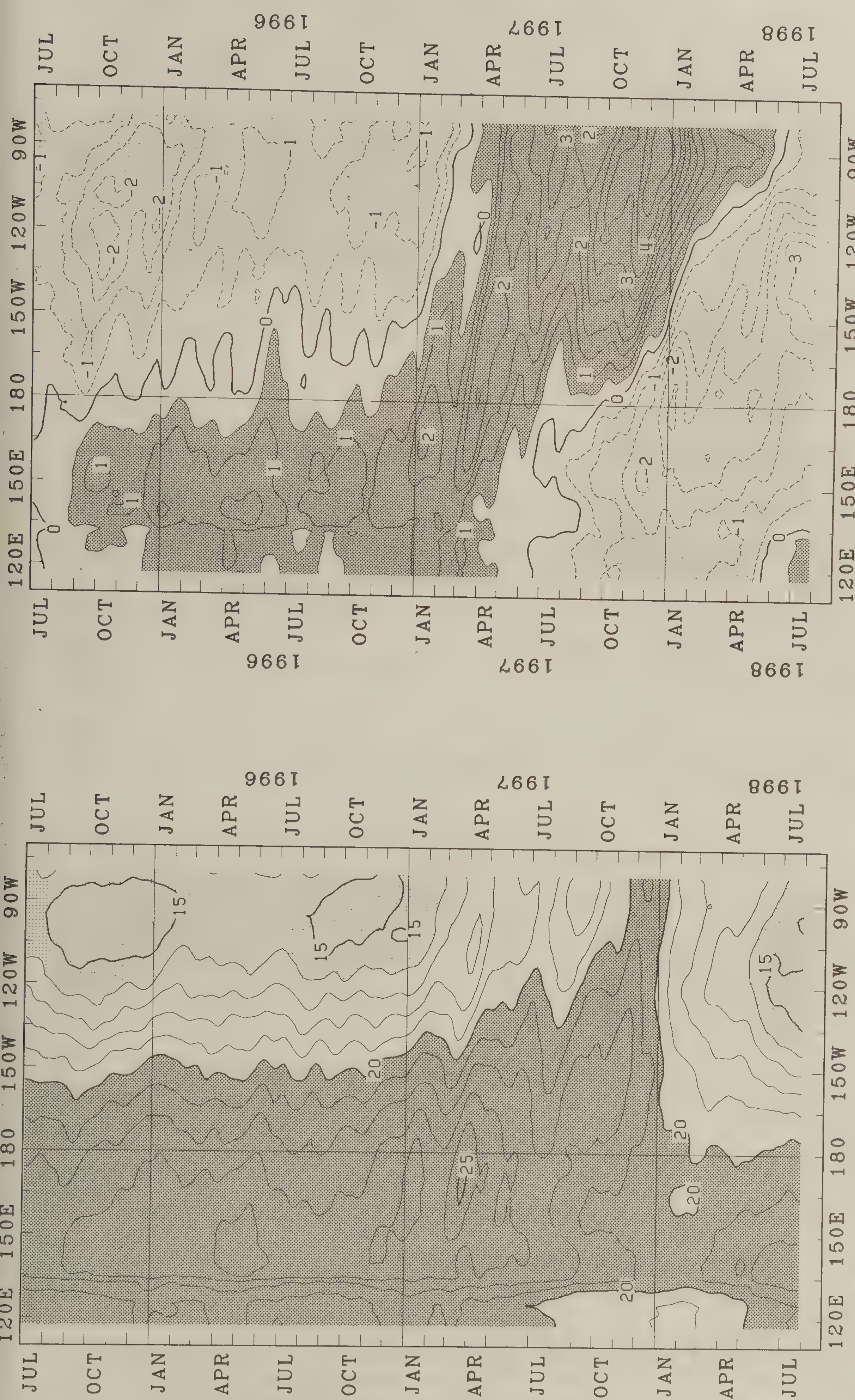
Table 1　El Nino Monitoring indices



第 25 図　赤道に沿った海面水温（左）および偏差（右）の時間-経度断面図

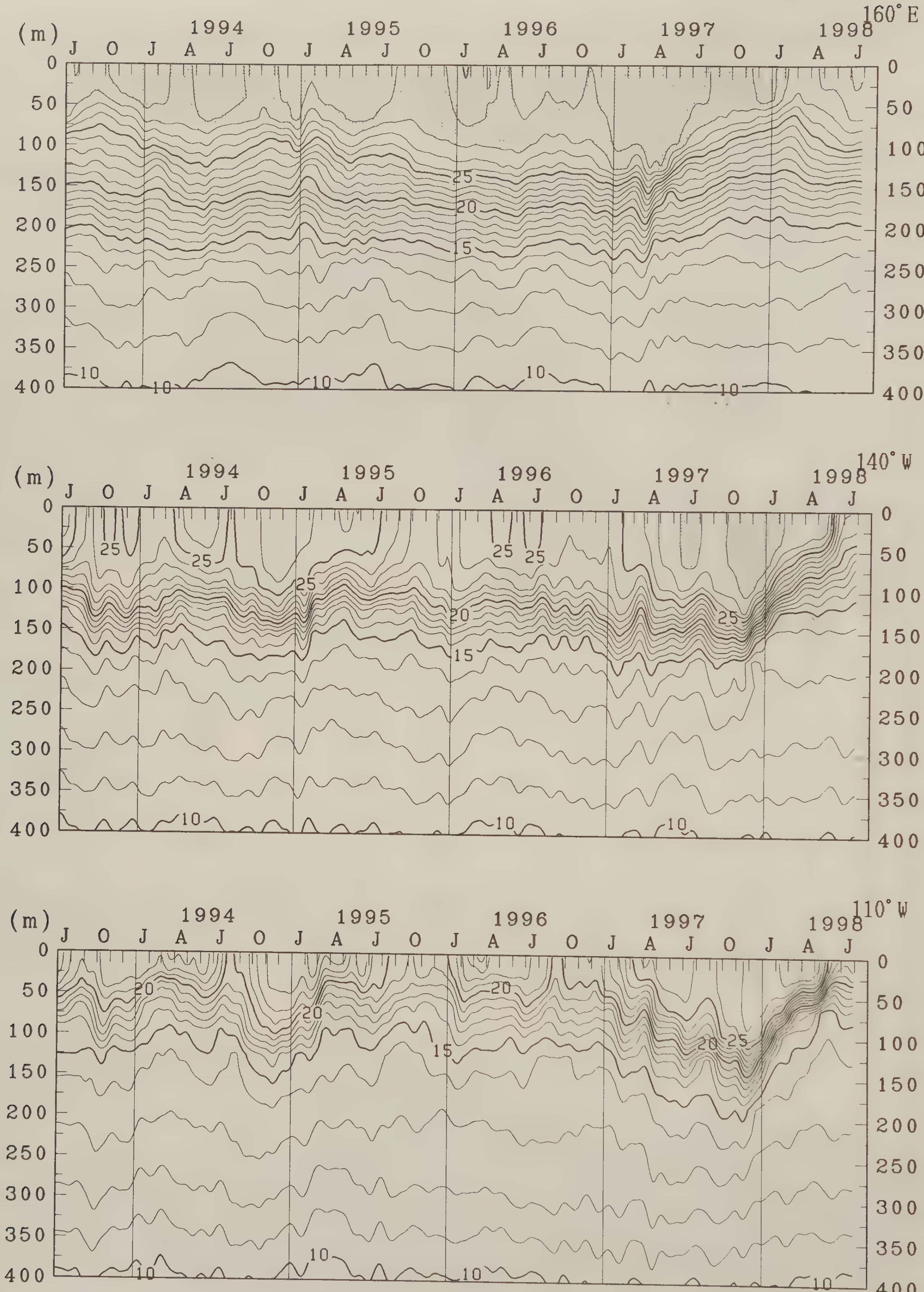
Fig.25 Time-longitude sections of SSTs (left) and anomalies (right) along the equator (2 °N-2 °S) in the global ocean. Contour interval is 1 °C (left) and 0.5 °C (right). Values greater than 28 °C are shaded and values less than 23 °C are spotted in the left panel. Dashed contours indicate negative anomalies in the right panel. Anomalies are computed from 1961-1990 base period means.

Time-Longitude Sections of Ocean Heat Content & Anomalies (Eq.)



第26図　太平洋の赤道に沿う海洋表層の貯熱量（左）及び偏差（右）の時間－経度断面図

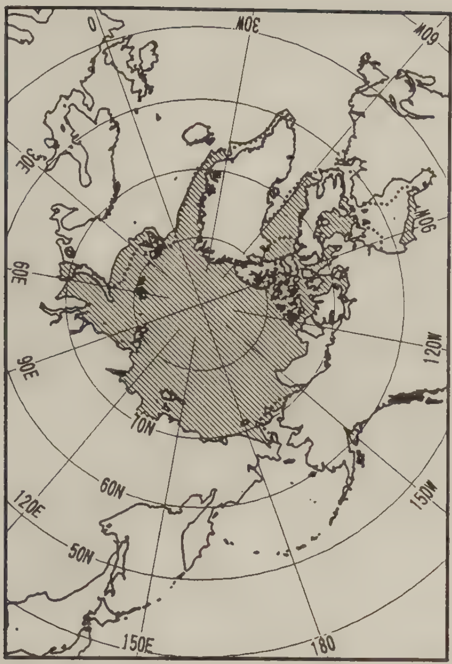
Fig.26 Time-longitude sections of ocean heat content in the upper 260m along the equator (left) and anomalies (right) in the Pacific Ocean. Data are derived from the Ocean Data Assimilation System of JMA. Contour interval is 1°C (left) and 0.5°C (right). Values greater than 20°C are shaded and values less than 16°C are spotted in the left panel. Dashed contours indicate negative anomalies in the right panel. Anomalies are computed from 1987-1997 base period means.



第27図　太平洋赤道域の表層水温の時間－深度断面図

(上：西部、中：中部、下：東部)

Fig.27 Time-depth sections of equatorial subsurface temperature for the western Pacific (top, 160°E), the central Pacific (middle, 140°W) and the eastern Pacific (bottom, 110°W). Data are derived from the Ocean Data Assimilation System of JMA. Contour interval is 1°C. Values greater than 28°C are shaded.

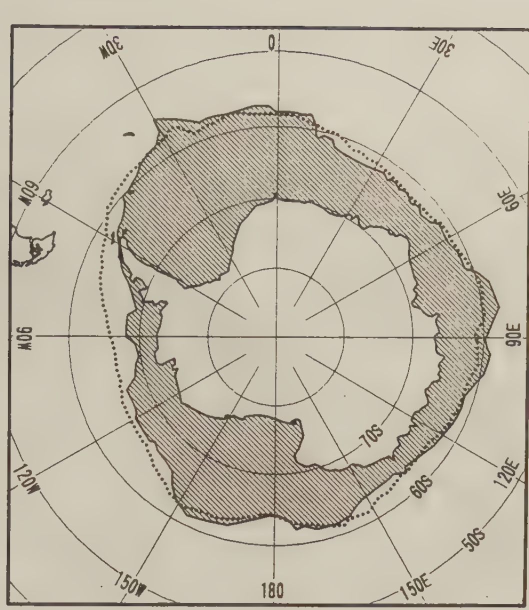


第28-1図 北極域の海氷図（1998年 7月22日）

Fig.28-1 Sea ice chart in the Arctic on 22 July 1998.

The shaded area represents the sea ice extent. The dotted line denotes the mean ice edge averaged for the period from 1972 through 1990.

The data source is the National Ice Center (USA).



第28-2図 南極域の海氷図（1998年 7月10日）

Fig.28-2 Sea ice chart in the Antarctic on 10 July 1998.

The shaded area represents the sea ice extent. The dotted line denotes the mean ice edge averaged for the period from 1973 through 1990.

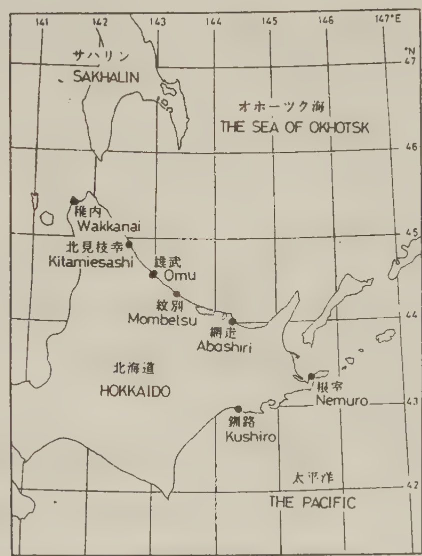
The data source is the National Ice Center (USA).

第28-1表 流氷に関する初終日（1997年12月から1998年５月まで）

Table 28-1. First and last dates of drift ice at coastal stations (From December 1997 to May 1998).

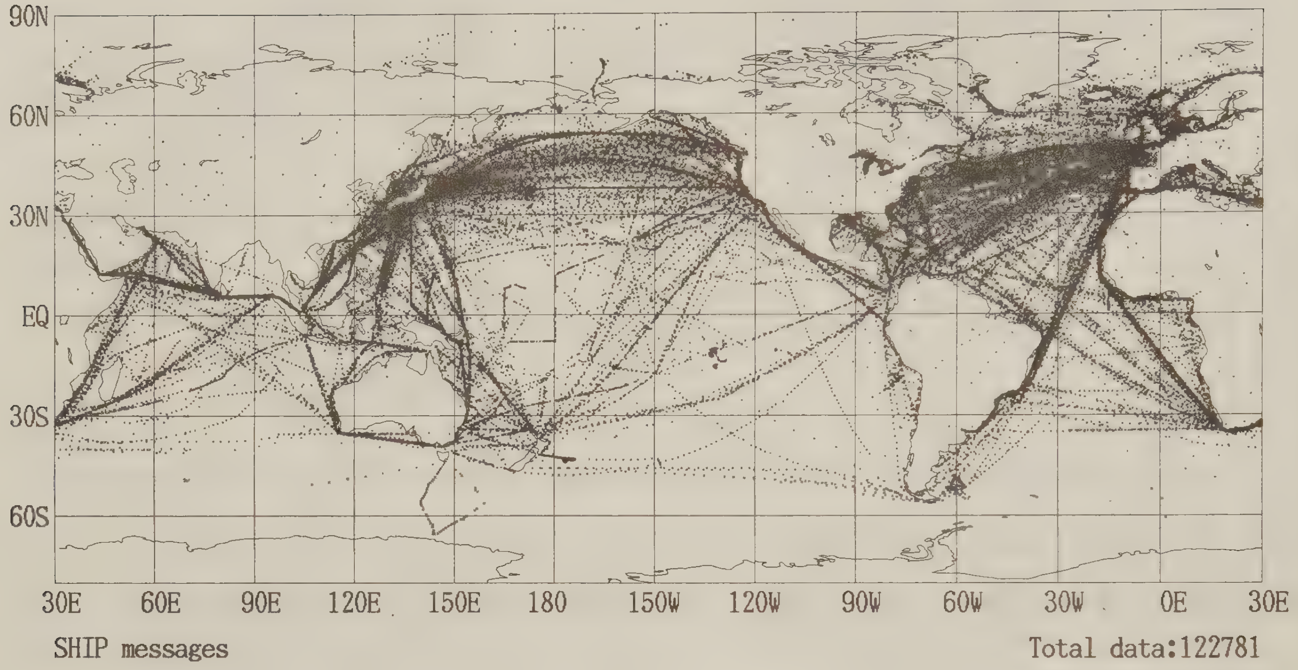
地点 Station	流氷 Drift ice 初日 First date	終日 Last date	期間 Period	日数 Days	接岸初日 First date of drift ice on shore	海明け First date of shore lead appearance
稚内 WAKKANAI	——	——	—	0(-15)	——	*
北見枝幸 KITAMIESASHI	1.27(+7)	3.20(-11)	53(-18)	37(-15)	2.07(+11)	3.02(+11)
雄武 OMU	1.27(+8)	3.11(-26)	44(-34)	38(-23)	2.08(+11)	3.06(-8)
紋別 MOMBETSU	1.17(-1)	3.20(-18)	63(-17)	53(-11)	2.06(+7)	3.20(+3)
網走 ABASHIRI	1.16(-1)	3.26(-23)	70(-22)	63(-20)	1.27(-1)	3.19(-5)
根室 NEMURO	2.11(+2)	3.27(-6)	45(-8)	38(+4)	2.16(+2)	*
釧路 KUSHIRO	——	——	—	*	——	*

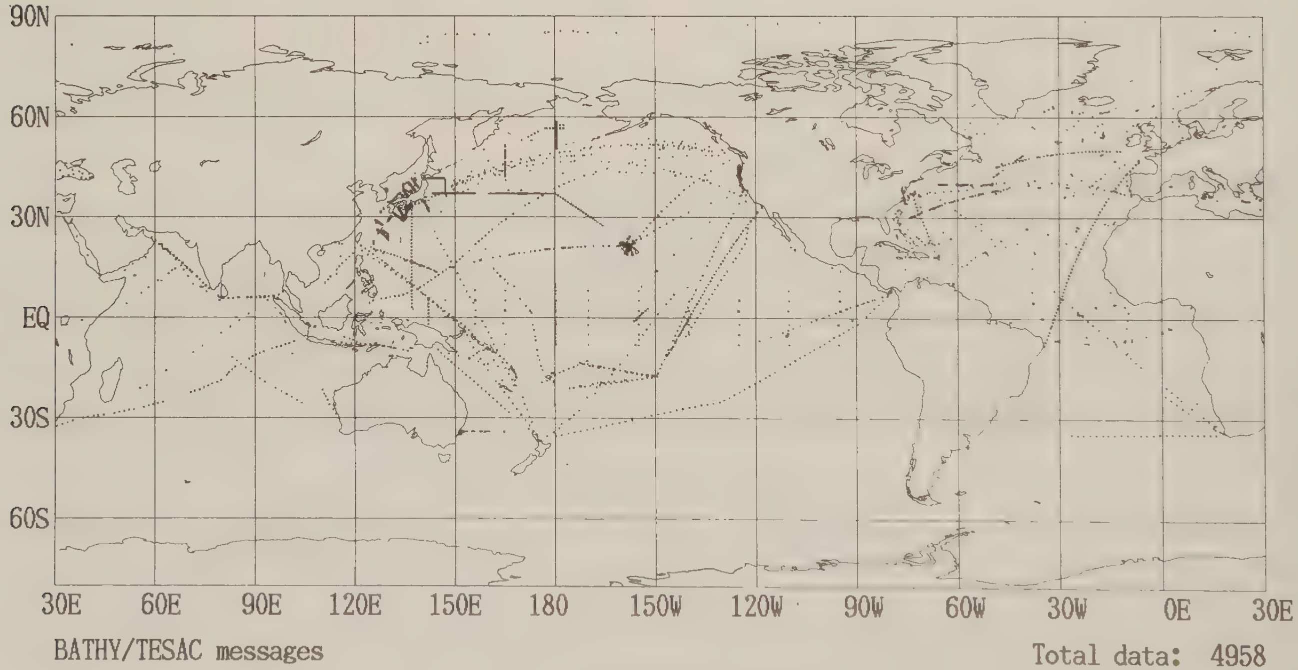
() : deviation from normal for the period from 1961 to 1990
＋ : earlier or more than normal
－ : later or less than normal
＊ : no observations , — : no phenomenon



第28-3図 沿岸海氷観測地点地図

Fig. 28-3 Map of the coastal stations

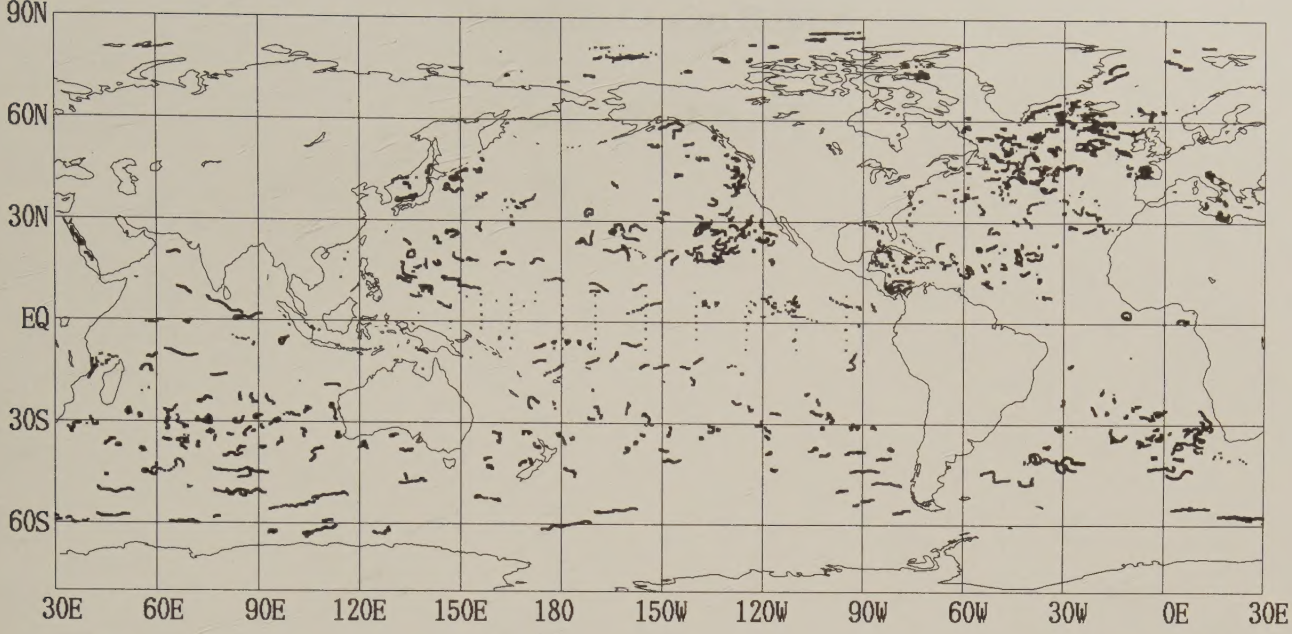




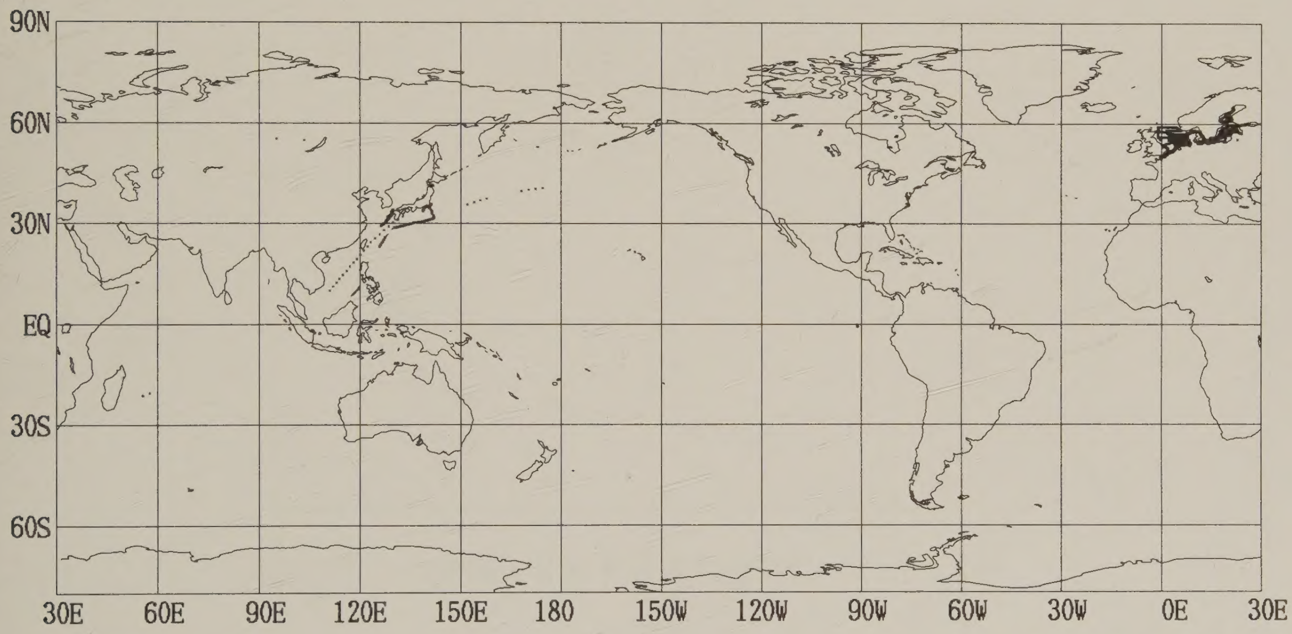
第29-1図　測点分布図(1998年 7月)

Fig.29-1 Geographical distribution of SHIP messages (SST data, top) and BATHY/TESAC messages (subsurface temperature data, bottom) for JUL 1998.

Geographical Distribution of Oceanographic Data



BUOY messages　　　　Total data:249052



TRACKOB messages　　　　Total data: 2202

第29-2図　測点分布図(1998年 7月)

Fig.29-2 Geographical distribution of BUOY messages (buoy drift and SST data, top) and TRACKOB messages (ship drift and SST data, bottom) for JUL 1998.

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